Cornell University Calendar

Fall Semester
Residence halls open
Freshman orientation begins
New-student orientation begins
Registration–course exchange
Instruction begins
Physical education classes begin
Fall break: instruction suspended
Instruction resumes
Pre-course enrollment for spring

Winter Session Period Begins
4-Week Classes Begin
Winter Session Period Ends

Spring Semester
Residence halls open for continuing students
Residence halls open for new students
Registration–course exchange
Instruction begins
Physical education classes begin
Spring break: instruction suspended
Instruction resumes
Pre-course enrollment for fall
Instruction ends
Study period
Final exams begin
Final exams end
Residence halls close

Summer Session 1995
Three-week session
Eight-week session
Six-week session

1995-96
Friday, August 25
Friday, August 25
Tuesday–Wednesday, August 29–30
Wednesday, August 29
Thursday, August 31
Monday, September 4
Saturday, October 7
Wednesday, October 11
Wednesday, October 25–
Wednesday, November 8
Friday–Sunday, November 3–5
Saturday, September 23
Wednesday, November 22
Monday, November 27
Saturday, December 9
Sunday–Wednesday, December 10–13
Thursday, December 14
Friday, December 22
Saturday, December 23
Tuesday, December 26 1995–
Saturday, January 20, 1996

1996-97
Friday, August 23
Friday, August 23
Tuesday–Wednesday, August 27–28
Thursday, August 29
Monday, September 9
Saturday, October 12
Wednesday, October 16
TBA
TBA
TBA

Wednesday, November 27
Monday, December 2
Saturday, December 7
Sunday–Wednesday, December 8–11
Thursday, December 12
Friday, December 20
Saturday, December 21

Thursday, December 26
Thursday, January 2
Saturday, January 18
Sunday, January 12
Monday, January 13
Thursday–Friday, January 16–17
Monday, January 20
Monday, February 3
Saturday, March 24
TBA
TBA
TBA

Saturday, May 3
Sunday–Wednesday, May 4–7
Thursday, May 8
Friday, May 16
Saturday, May 17
Sunday–Saturday, May 18–24
Sunday, May 25

Wednesday, May 29–Friday, June 21
Monday, June 10–Tuesday, August 6
Monday, June 24–Tuesday, August 6

Wednesday, June 4
Monday, June 16
Monday, June 30

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

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

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

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

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

This catalog was produced by Media Services at Cornell University.
Cornell University Executive Officers

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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, sexual orientation, age, or handicap. The university is committed to the maintenance of affirmative action programs that will assure the continuation of such equality of opportunity. Sexual harassment is an act of discrimination and, as such, will not be tolerated. Inquiries concerning the application of Title IX may be referred to Cornell’s Title IX coordinator (assistant director, gender equity) at the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853-2801 (telephone: 607 255-3976; TDD: 607 255-7605).

Cornell University is committed to assisting those persons with disabilities who have special needs. A brochure describing services for persons with disabilities may be obtained by writing to the Office of Equal Opportunity, Cornell University, 234 Day Hall, Ithaca, New York 14853-2801. Other questions or requests for special assistance may also be directed to that office.

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Introduction

Courses of Study contains information primarily concerned with academic resources and procedures, college and department programs, interdisciplinary programs, and undergraduate and graduate course offerings of the university. Not included in this publication is information concerning the Medical College and the Graduate School of Medical Sciences, located in New York City. A student handbook describing life at Cornell will be distributed to all new incoming students. In addition, each new student receives the Policy Notebook, which summarizes pertinent university policy. Students should consult with their college’s advising office for specific information on academic policies and procedures, degree programs and requirements.

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

The following is a list of offices and information sources for admission information:

Undergraduate admissions. Information pertinent to prospective applicants is available from the Undergraduate Admissions Office, 410 Thurston Avenue, Ithaca, New York 14853-9088 (telephone: 607/255-9088).

Graduate School. Information pertaining to admission to the Graduate School may be obtained by contacting the Graduate School, 100 Sage Graduate Center, Ithaca, New York 14853-6201 (telephone: 607/255-5141).


Medical College and Graduate School of Medical Sciences. Information regarding admissions is available from the Office of Admissions, 1300 York Avenue, New York, New York 10021 (telephone: 212/746-1007).

CUINFO/GOPHER

It is not possible to keep this single-volume course list completely up-to-date. The most current information regarding course schedules, sections, rooms, credits, and registration procedures may be found on CUINFO, Cornell’s electronic information source, and in the Course and Time Roster and the Course and Room Roster, each issued twice a year by the Office of the University Registrar. You may access CUINFO using either telnet or gopher. Telnet to port 300 on host gopher2.cit.cornell.edu. To use gopher, connect to gopher.cit.cornell.edu. Students are also advised to consult individual college and department offices for up-to-date course information.

EXPLANATION OF COURSE NUMBERING SYSTEMS

The course levels have been assigned as follows:

- 100-level course—introductory course, no prerequisites, open to all qualified students
- 200-level course—lower-division course, open to freshmen and sophomores, may have prerequisites
- 300-level course—upper-division course, open to juniors and seniors, prerequisites
- 400-level course—upper-division course, open to seniors and graduate students, 200- and 300-level course prerequisites or equivalent
- 500-level course—professional level (e.g., management, law, veterinary medicine)
- 600-level course—graduate-level course, open to upper-division students
- 700-level course—graduate-level course
- 800-level course—master’s level, thesis, research
- 900-level course—doctoral level, thesis, research

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

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

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

Group 2: Graduate professional divisions

Law
Management
Veterinary Medicine

Advanced Placement

CREDIT FOR ADVANCED PLACEMENT

Definition and Purpose of Advanced Placement Credit

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

Sources of Advanced Placement Credit

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

a. Achieving the requisite score on a departmental examination at Cornell (usually given during orientation week) or from the Advanced Placement Examinations from the College Entrance Examination Board (CEEB). The requisite scores, which vary by subject, are determined by the relevant departments at Cornell and are listed on page 7.

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

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

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

Advanced placement examinations. Entering freshmen should have their scores from CEEB Advanced Placement Examinations sent to their college or school office (see below, "Forwarding of scores and transcripts").

Departmental advanced standing examinations. In certain subjects, students may also qualify for advanced placement or credit, or both, on the basis of departmental examinations given on campus during orientation week. A schedule of these examinations will appear in the orientation booklet that will be mailed to entering students in late summer. The departments that award advanced placement and credit on the basis of departmental examinations are shown on page 7.

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

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

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

- College of Agriculture and Life Sciences 177 Roberts Hall
- College of Architecture, Art, and Planning B2 West Sibley Hall
- College of Arts and Sciences M46 Goldwin Smith Hall
- College of Engineering 170 Olin Hall
- School of Hotel Administration 138 Statler Hall
- College of Human Ecology N101 Van Rensselaer Hall
- School of Industrial and Labor Relations 101 Ives Hall

DETERMINATION OF CREDIT AND PLACEMENT

The table on page 7 provides information on how credit and placement are determined for most subjects. Supplementary information for subjects requiring additional explanation is provided below.

**Biological Sciences**

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

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

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

Biological sciences majors who receive a score of 5 may receive eight credits and be exempt from all introductory biology courses or elect to receive four credits and select one of the options allowed for majors with a score of 4. The student receiving a score of 4 must fulfill the introductory biology requirement by taking Biological Sciences 101-102, 102/104, or 105-106 or 105 or 106 (Biological Sciences, Lectures and Laboratory). These students should consult information available in the Biological Sciences 101-104 course office (1140 Comstock Hall) and the Biology Center (216 Stimson Hall) to determine which semester to take to complete the introductory biology requirement. For students in doubt, Biological Sciences 101-105 is advised. These students will receive a total of eight introductory biology credits (four advanced placement credits plus four course credits).

**Chemistry**

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

Freshmen may qualify for advanced placement and advanced standing credits in chemistry by satisfactory performance on the CEEB Advanced Placement Examination in chemistry or by passing an advanced standing examination offered by the department. A score of 5 on the CEEB examination entitles a student to four credits. A student may earn four or eight credits by suitable performance on the departmental examination. To take the departmental examination students must sign up beforehand with Mrs. Virginia Marcus, in 131 Baker Laboratory.

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

**Classics**

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

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

**Greek and Modern Greek.** Credit and placement are determined on the basis of a departmental examination. For Ancient Greek, a student who is permitted to register in a 300-level course will be given six advanced placement credits. For Modern Greek, a student who is determined by the examiner to be at an advanced level will be given six advanced placement credits.

**Computer Science**

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

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

"Forwarding of scores and transcripts"
### Summary of Credit and Placement

<table>
<thead>
<tr>
<th>Subject</th>
<th>Score</th>
<th>Advanced Placement Credit</th>
<th>Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arabic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department of Near Eastern Studies determines credit and placement based on departmental examination.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arabic (majors)</td>
<td>5</td>
<td>8 credits or 4 credits</td>
<td>Placement out of all introductory courses. Students may choose to accept only 4 credits and follow the guidelines for majors with a score of 4.</td>
</tr>
<tr>
<td>Arabic (nonmajors)</td>
<td>5</td>
<td>6 credits</td>
<td>Placement out of all introductory courses.</td>
</tr>
<tr>
<td>Biology (majors)</td>
<td>4</td>
<td>4 credits</td>
<td>4 AP credits awarded after completion of any combination of 4 credits from 101–104 or 105 or 106. Consult department to determine which semester to take to complete introductory biology.</td>
</tr>
<tr>
<td>Biology (nonmajors)</td>
<td>4</td>
<td>4 credits</td>
<td>Placement out of 109–110. Does not always satisfy the prerequisite for second- and third-level courses in biology.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5</td>
<td>4 credits</td>
<td>Department determines placement.</td>
</tr>
<tr>
<td>Computer science</td>
<td>4.5</td>
<td>4 credits</td>
<td>Placement out of C.S. 100.</td>
</tr>
<tr>
<td>Economics, micro</td>
<td>4.5</td>
<td>3 credits</td>
<td>Placement out of Economics 101.</td>
</tr>
<tr>
<td>Economics, macro</td>
<td>4.5</td>
<td>3 credits</td>
<td>Placement out of Economics 102.</td>
</tr>
<tr>
<td>English</td>
<td>4.5</td>
<td>3 credits</td>
<td>Department of Modern Languages and Linguistics determines placement. Students may earn additional credit by taking CASE examination.</td>
</tr>
<tr>
<td>French language</td>
<td>4.5</td>
<td>3 credits (and proficiency)</td>
<td>Department of Romance Studies determines placement.</td>
</tr>
<tr>
<td>German</td>
<td>4.5</td>
<td>3 credits (and proficiency)</td>
<td>Department of German Studies determines placement in literature courses. Department of Modern Languages and Linguistics determines placement in language courses. Students may earn additional credit by taking CASE examination.</td>
</tr>
<tr>
<td>Government and politics, U.S.</td>
<td>4.5</td>
<td>3 credits</td>
<td>Placement out of Government 111.</td>
</tr>
<tr>
<td>Government and politics, comparative</td>
<td>4.5</td>
<td>3 credits</td>
<td>Placement out of Government 131.</td>
</tr>
<tr>
<td>Greek, Ancient and Modern</td>
<td></td>
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<tr>
<td>Hebrew</td>
<td>4.5</td>
<td>3 credits</td>
<td>Department of Near Eastern Studies determines placement based on departmental examination.</td>
</tr>
<tr>
<td>American history</td>
<td>4.5</td>
<td>4 credits</td>
<td>Department of Modern Languages and Linguistics determines placement. Students may earn additional credit by taking CASE examination.</td>
</tr>
<tr>
<td>European history</td>
<td>4.5</td>
<td>4 credits</td>
<td>Department of Modern Languages and Linguistics determines placement. Students may earn additional credit by taking CASE examination.</td>
</tr>
<tr>
<td>History of art</td>
<td>4.5</td>
<td>3 credits</td>
<td>Department of Modern Languages and Linguistics determines placement. Students may earn additional credit by taking CASE examination.</td>
</tr>
<tr>
<td>Italian language</td>
<td>4.5</td>
<td>3 credits</td>
<td>Department of Modern Languages and Linguistics determines placement. Students may earn additional credit by taking CASE examination.</td>
</tr>
<tr>
<td><strong>Italian literature</strong></td>
<td>4.5</td>
<td>3 credits (and proficiency)</td>
<td>Department of Romance Studies determines placement.</td>
</tr>
<tr>
<td>Latin</td>
<td></td>
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<tr>
<td>Mathematics BC (excluding engineering students)</td>
<td>4.5</td>
<td>8 credits</td>
<td>Placement out of 111, 112. Permission to take 221, 293, or 213.</td>
</tr>
<tr>
<td>Mathematics BC (excluding engineering students)</td>
<td>2 or 3</td>
<td>4 credits</td>
<td>Placement out of 111. No advanced placement credit for students who take 111. Permission to take 112 or 192.</td>
</tr>
<tr>
<td>Mathematics AB (excluding engineering students)</td>
<td>4.5</td>
<td>4 credits</td>
<td>Placement out of 111. Permission to take 112, 122, or 192.</td>
</tr>
<tr>
<td>Mathematics AB (excluding engineering students)</td>
<td>3</td>
<td>4 credits</td>
<td>Placement out of 111. Permission to take 112 or 192.</td>
</tr>
<tr>
<td>Music</td>
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<tr>
<td>Physics B</td>
<td>4.5</td>
<td>8 credits</td>
<td>Placement out of Physics 101–102.</td>
</tr>
<tr>
<td>Physics B and Mathematics BC</td>
<td>4.5</td>
<td>4 credits in physics</td>
<td>Placement out of Physics 101.</td>
</tr>
<tr>
<td>Physics C—Mechanics</td>
<td>4.5</td>
<td>4 credits</td>
<td>Student may choose placement out of Physics 112 or 207 instead of Physics 101–102.</td>
</tr>
<tr>
<td>Physics C—Electricity and Magnetism</td>
<td>5</td>
<td>4 credits</td>
<td>Student may choose placement out of Physics 112 or 207, or placement into Physics 116 with no AP credit. For more information, contact department representative.</td>
</tr>
<tr>
<td>Psychology</td>
<td>4.5</td>
<td>3 credits</td>
<td>Placement out of Psychology 101.</td>
</tr>
<tr>
<td>Sociology</td>
<td></td>
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</tr>
<tr>
<td>Spanish language</td>
<td>4.5</td>
<td>3 credits</td>
<td>Department of Modern Languages and Linguistics determines placement. Students may earn additional credit by taking CASE examination.</td>
</tr>
<tr>
<td>Spanish literature</td>
<td>4.5</td>
<td>3 credits (and proficiency)</td>
<td>Department of Romance Studies determines placement.</td>
</tr>
<tr>
<td>Turkish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department of Near Eastern Studies determines credit and placement based on departmental examination.</td>
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<tr>
<td>Department of Modern Languages and Linguistics, 203 Morrill Hall.</td>
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</tbody>
</table>

†Cornell Advanced Standing Examination. Contact the Department of Modern Languages and Linguistics, 203 Morrill Hall.
English
The English department will grant 3 credits to students who score 4 or 5 on the CEEB Advanced Placement Examination. The credits are granted automatically; no application to the department is required.

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

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

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

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

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

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

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

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

The placement examination in mathematics is offered at Cornell only during orientation week and should be taken by students who
1) have had at least a semester of calculus but did not take a CEEB Advanced Placement Examination;
2) have received a 2 on the BC examination or a 3 on the AB examination and want to enter the upper sequence; or
3) believe that the placement assigned on the strength of the CEEB Advanced Placement Examination is not high enough in their case.

Students who receive an AP exam score of 4 or 5 on the AB or BC examination 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 are eligible to take Cornell's Advanced Standing Examination (CASE). Outstanding performance on this examination could provide three additional credits.

Physics
Advanced placement and credit are awarded on the basis of the CEEB Advanced Placement Examination in physics (Physics B or physics C), certain international examinations, or the departmental examination (which may be taken during orientation week or at other times as arranged). For information about the departmental examination, students should consult the Director of Undergraduate Studies, Professor R. S. Galik, 100 Clark Hall, or the Department Chair.

Physics B. Students earning a score of 4 or 5 may receive eight credits for Physics 101 and 102. Those earning a score of 5 in physics B with a score of 4 or 5 in calculus BC 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—Mechanics: Students earning a score of 4 or 5 may receive four credits for Physics 112 or 207, or placement into Physics 116 with no AP credit.

Physics C—Electricity and Magnetism: Students earning a score of 5 may choose four credits for Physics 213, or placement into Physics 217 with no AP credit. A student planning a major in Physics or Applied and Engineering Physics and who is eligible for credit under 1) or 2) above may consult with his/her adviser or the department representative.

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. S. Galik, 101 Clark Hall, or from the Department of Physics, Cornell University, 109 Clark Hall.

ADVANCED PLACEMENT AND CREDIT FOR INTERNATIONAL CREDENTIALS
Following are the policies currently in effect for G.C.E. "A" Level Examinations and International Baccalaureate Higher Level Examinations. Accepted students holding any other secondary school credentials are urged to sit for the Advanced Placement Examinations of the College Entrance Examination Board or for the departmental examinations offered during orientation week. Students requiring further information concerning advanced standing credit for foreign credentials may contact the Associate Director, Undergraduate International Admissions.

General Certificate of Education (GCE) Advanced ("A") Level Examination passes are awarded advanced standing and credit. Students must present the original or a certified copy of their examination certificate to the Associate Director, International Admissions, in order to receive credit. The following overseas examinations are recog-
nized by Cornell as equivalent to GCE "A" Levels.

- Matriculation examination of the University of Hong Kong (Advanced Level)
- Advanced Level examination of the University of Hong Kong
- E. African Advanced Certificate of Education (principal passes only)
- W. African Advanced Level General Certificate of Education
- Joint examination for the Higher School Certificate and Advanced Level General Certificate of Education in Malaysia and Singapore (principal passes only)

Following is a list of subjects and the marks for which credit will be awarded:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>A or B</td>
<td>8 credits</td>
</tr>
<tr>
<td>Chemistry</td>
<td>A</td>
<td>8 credits (Chem 207 and 208)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>4 credits (Chem 207)</td>
</tr>
<tr>
<td>Economics</td>
<td>A</td>
<td>6 credits (Econ 101 and 102)</td>
</tr>
<tr>
<td>English</td>
<td>A</td>
<td>6 credits</td>
</tr>
<tr>
<td>Literature</td>
<td>B</td>
<td>3 credits</td>
</tr>
<tr>
<td>Geography</td>
<td></td>
<td>subject to departmental review</td>
</tr>
<tr>
<td>History</td>
<td>A, B, or C</td>
<td>4 credits</td>
</tr>
<tr>
<td>Mathematics</td>
<td>A or B</td>
<td>8 credits (Math 111 and 112)</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>4 credits (Math 111)</td>
</tr>
<tr>
<td>Music</td>
<td>A or B</td>
<td>3 credits</td>
</tr>
<tr>
<td>Physics</td>
<td>A or B</td>
<td>4 credits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>for Physics 101, 112, or 207</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 additional credits for Physics 212 are granted for a combination of grades of A or B and a minimum of 8 in Advanced Placement (or Advanced Standing) credits in Mathematics. Students planning to major in physics should consider enrolling in Physics 217.</td>
</tr>
</tbody>
</table>

International Baccalaureate (IB) Higher Level Examination passes are awarded advanced standing and credit as follows. The original or a certified copy of the examination results must be shown to the Associate Director, International Admissions.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology</td>
<td></td>
<td>subject to departmental review</td>
</tr>
<tr>
<td>Biology</td>
<td>7</td>
<td>8 credits</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6 credits</td>
</tr>
<tr>
<td>Chemistry</td>
<td>7</td>
<td>8 credits (Chem 207 and 208)</td>
</tr>
<tr>
<td></td>
<td>5 or 6</td>
<td>4 credits (Chem 207)</td>
</tr>
<tr>
<td>Economics</td>
<td>6 or 7</td>
<td>6 credits</td>
</tr>
<tr>
<td>English</td>
<td>7</td>
<td>6 credits</td>
</tr>
<tr>
<td>Literature</td>
<td>6</td>
<td>3 credits</td>
</tr>
<tr>
<td>Geography</td>
<td></td>
<td>subject to departmental review</td>
</tr>
<tr>
<td>History</td>
<td></td>
<td>subject to departmental review</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6 or 7</td>
<td>8 credits (prospective math, science, and engineering majors must consult with math department to determine prerequisite for placement in third-semester math courses)</td>
</tr>
<tr>
<td>Music</td>
<td></td>
<td>subject to departmental review</td>
</tr>
<tr>
<td>Philosophy</td>
<td>7</td>
<td>3 credits</td>
</tr>
<tr>
<td>Physical</td>
<td></td>
<td>Science 6 or 7 4 credits (Phys 112 or 207)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Physics 6 or 7 4 credits (Phys 112)</td>
</tr>
</tbody>
</table>

For more information about advanced placement or other academic questions, please contact the Associate Director, International Admissions, Undergraduate Admissions Office, 410 Thurston Avenue, Ithaca, NY 14850–2488.

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

To become a registered student at Cornell University, a person must
- complete course enrollment according to individual college requirements;
- settle all financial accounts, including current semester tuition;
- satisfy New York State health requirements;
- have no holds from the college, the office of the Judicial Administrator, Gannett Clinic, or the Bursar.

Individuals must become registered students by the end of the third week of the semester. Cornell University does not allow persons who are not registered with the university in a timely manner to attend classes. The university reserves the right to require unauthorized, unregistered persons who attend classes or in other ways seek to exercise student privileges to leave the university premises. The university does not permit retroactive registration and does not record courses or grades for unregistered persons.

**Course Enrollment**

Pre-course enrollment for each semester at Cornell takes place partway through the preceding semester. Dates are announced in advance and are usually posted in school and college offices. Each college or school notifies students about special procedures. Students are often expected to meet with their advisers during this period to affirm that the courses they plan to take will ensure satisfactory progress toward a degree.

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.

**Course ADD/DROP/CHANGE**

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

<table>
<thead>
<tr>
<th>Late Course Enrollment and Late Add/Drop/Change Fees</th>
<th>Late Course Fee</th>
<th>Late Drop/Change Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education and Summer Sessions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnson Graduate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School of Management</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>Law School</td>
<td>No fee</td>
<td>No fee</td>
</tr>
<tr>
<td>Physical education</td>
<td>$30</td>
<td>$20*</td>
</tr>
<tr>
<td>Veterinary medicine</td>
<td>$15*</td>
<td>$15*</td>
</tr>
</tbody>
</table>

*Consult the college office for special considerations and requirements.
†Consult the Summer Session catalog and the Division of Extramural Study brochure for fees.
AUDITING COURSES
Summer school and extramural students may officially register as visitors (auditors) in courses and have this entered on their permanent records if their attendance is reported as satisfactory. Graduate students may register for courses as auditors but will not have the courses listed on their transcripts. Undergraduates may not register to audit courses.

LEAVES AND WITHDRAWALS
A leave of absence must be requested from the college in which the student is enrolled. A leave of absence is granted for a specified time, after which the student is expected to return to resume course work. Students should inform their college of intent to return.

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

Medical leaves are granted and processed through University Health Services.

Internal Transfer Division
Students may not always be satisfied with the original Cornell school or college into which they've been admitted. They may decide to transfer from one college to another, within the university. This process is called internal transfer, and application procedures and deadlines vary by college. It may be possible to be admitted directly into a new program. Students who are uncertain if they immediately qualify for direct transfer, however, should apply to the Internal Transfer Division (ITD).

To apply, candidates must interview with the division's director and submit an essay to the ITD office outlining their reasons for wanting to transfer. Internal Transfer Division applicants must also fulfill the application requirements (e.g., interviews, essays) of their target college as if they were applying for direct transfer. In many cases, colleges formally sponsor students in ITD and essentially guarantee admission if students successfully complete the requirements (taking particular courses, earning a specified grade point average while enrolled in ITD) that are outlined in their letter of sponsorship. Although sponsorship does not guarantee admission to the Internal Transfer Division, it is the most important factor determining acceptance into ITD. Students can apply simultaneously for direct transfer and to ITD, so that if direct transfer is denied they might be offered the option of being sponsored in the Internal Transfer Division.

For more information about transfer requirements, students should contact the admissions office of the college they hope to enter and the office of the Internal Transfer Division, 220 Day Hall (255-4386).

Bursar Information
TUITION, FEES, AND EXPENSES
Tuition for Academic Year 1995-96
Endowed Divisions
Undergraduate
Architecture, Art, and Planning $20,000
Arts and Sciences
Engineering
Hotel Administration
Graduate
Graduate School (with major chair in an endowed division) 20,000
Professional
Law School 21,135
Management 21,480
Statutory Divisions
Undergraduate
Agriculture and Life Sciences $8,100
Human Ecology
Industrial and Labor Relations Nonresident* 15,900
Graduate School—Veterinary Medicine 10,150
Professional
Veterinary Medicine New York resident* 12,650
Nonresident* 17,000
Summer Session (1995)
Per credit 475 (estimated)
Other Tuition and Fees
In absenta fees
Graduate $200 per term
Undergraduate 15 per term
Law and Management 75 per term
The amount, time, and manner of payment of tuition, fees, or other charges may be charged at any time without notice.
Residency status is determined at the time of admission by the college. Change in residency status is determined by the bursar.
Fees and Expenses
Undergraduate applicants to Cornell pay a nonrefundable $60 application fee when submitting an application for admission. The graduate application fee is $60. Application to the Johnson Graduate School of Management costs $85 (domestic), $110 (international).

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

First-time matriculants will be charged tuition from the university registration day through the date of their request as follows: first six days of the semester (including university registration day), no charge; seventh day of the semester, 10 percent; second and third weeks, 20 percent; fourth week, 30 percent; fifth and sixth weeks, 40 percent; seventh week, 50 percent; eighth and ninth weeks, 60 percent; tenth week to the end of the semester, 100 percent.

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

Refund Schedule for Withdrawals and Leaves of Absence
Fall 1995 and Spring 1996
Previously Matriculated Students
Percent Fall 1995 Spring 1996
No charge 8/29-9/5 1/18-1/24
10% charge 9/6 1/25
20% charge 9/7-9/13 1/26-2/1
30% charge 9/14-9/20 2/2-2/8
40% charge 9/21-9/27 2/9-2/15
60% charge 9/28-10/4 2/16-2/22
80% charge 10/5-10/15 2/23-2/29
100% charge 10/16/95 3/1/96
First-Time Matriculated Students
Percent Fall 1995 Spring 1996
No charge 8/29-9/5 1/18-1/24
10% charge 9/6 1/25
20% charge 9/7-9/20 1/26-2/8
30% charge 9/21-10/15 2/9-2/15
40% charge 10/16-10/22 2/16-2/29
50% charge 10/23-10/29 3/1-3/7
60% charge 10/30-11/12 3/8-3/30
100% charge 11/13/95 3/31/96

BILLING AND PAYMENT
Billing
Tuition and room and board charges will be billed in July and December and must be paid prior to registration. The due date for these semester bills will normally be five to ten working days prior to ID validation day. All other charges, credits, and payments will
appear on monthly statements mailed before the twenty-fifth of every month. It is possible that some charges will not be listed on the first bill and will appear on a subsequent monthly bill. A student must be prepared to pay any charges appearing on a subsequent bill. If a student receives a financial aid stipend before the charges are billed.

All bills are due by the date stated on the bill; all payments must be received by that date to avoid finance charges. Payments are not processed by postmark. Please inform the Office of the Bursar of any change in billing address. Address changes made at other offices will not change the billing address. The address initially used on billing statements will be the home address as listed on each student’s application for admission.

Payments
An individual who has outstanding indebtedness to the university will not be allowed to register* or reregister in the university, receive a transcript of record, be granted a leave of absence, or have a degree conferred. University policy precludes the use of any current financial aid for payment of past-due charges. The Office of the Bursar acts as a clearinghouse for student charges and credits that are placed directly on a student’s bill by several departments and offices of the university. Since the Office of the Bursar does not have detailed records concerning many items that appear on a bill, students should contact the office involved if they have questions.

For further information, students should contact the Office of the Bursar, Cornell University, 260 Day Hall, Ithaca, New York 14853 or (607) 255-6422. For specific exceptions, see “Bursar and CornellCard Procedures,” published by the Office of the Bursar, 260 Day Hall.

STUDENT HEALTH INSURANCE

It is a Cornell University policy, by a university board of trustees decision, that all full-time students have health insurance coverage while enrolled at Cornell. The student health plan offers extensive coverage at a reasonable cost for students and their eligible dependents. Plan benefit information will be mailed to all registered students (including students registered in absence) in their July bursar bill. If you decide that you have adequate coverage and want to waive the student health plan, a waiver form with proof of other coverage must be submitted to the student insurance office before the September 25 deadline. All full-time registered students, including students registered in absence, will be automatically billed and enrolled in the student health plan if a completed waiver is not received by the deadline. After the deadline, the plan is nonrefundable, except for dependents who no longer meet eligibility requirements.

Students enrolled in the student health plan may also enroll their eligible dependents for an additional charge. Enrollment deadline is September 25. A five-month graduate plan is available for those students who finish their degree requirements before the start of the spring semester. The deadline for application is prior to the start of the spring semester.

To obtain additional information about the Cornell University health plan, please contact the student insurance office at the Gannett Health Center, 10 Central Avenue, Ithaca, NY 14853 or (607) 255-6363. (e-mail: jbs68@cornell.edu)

Class Attendance, Meeting Times, and Examinations

CLASS ATTENDANCE AND ABSENCES

Students are expected to be present throughout each term at all meetings of courses which they are registered. The right to excuse a student from class rests at all times with the faculty member in charge of that class.

Absences because of religious beliefs. In accordance with Section 224-a of the New York State Education Law, each student who is absent from school because of his or her religious beliefs must be given an equivalent opportunity to register for classes or make up an examination, study, or work requirements that he or she may have missed because of such absence on any particular day or days. No fees of any kind shall be charged by the university for making available to such student such equivalent opportunity.

Class Meeting Times

All lectures, recitations, and similar exercises start at 8 a.m., 9:05 a.m., 10:10 a.m., 11:15 a.m., 12:20 p.m., 1:25 p.m., 2:30 p.m., or 3:35 p.m. and last fifty minutes, except that on Tuesday and Thursday the first and second, the third and fourth, the fifth and sixth, and the seventh and eighth periods may be combined to allow for longer meeting times. All laboratories and similar exercises that continue for 1 hour and 55 minutes, 2 hours and 25 minutes, or 3 hours are scheduled as shown below.

Schedule for Classes Longer than Fifty Minutes

1 hour and 55 minutes
8:00 a.m.—9:55 a.m.
10:10 a.m.—12:05 p.m.
12:20 p.m.—2:15 p.m.
2:30 p.m.—4:25 p.m.
7:30 p.m.—9:25 p.m.
2 hours and 25 minutes
7:30 a.m.—9:55 a.m.
10:10 a.m.—12:35 p.m.
2:00 p.m.—4:25 p.m.
7:30 p.m.—9:55 p.m.
3 hours
8:00 a.m.—11:00 a.m.
10:10 a.m.—1:10 p.m.
1:25 p.m.—4:25 p.m.
7:30 p.m.—10:30 p.m.

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

Review sessions cannot be scheduled after 4:30 p.m. on any day unless all students have no university conflict or an alternate session is made available for those with conflicts.

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

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

Evening academic activities commencing at 7:30 p.m. on Mondays and Wednesdays, other than regularly scheduled courses and prelims previously approved by the office of the university faculty, are not permitted. Violation of these rules interferes with other university activities (athletic, musical, theatrical, employment, etc.).

Any exception to the above regulations, other than those for evening preliminary examinations, will require permission of the dean or director of the college or school offering the course. Exceptions to the regulations on evening preliminary examinations require approval of the dean of the university faculty. All such exceptions must include provision of special arrangements for the students for whom conflicts are generated by such an exception.

FINAL EXAMINATIONS

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

General Rules Governing Final Examinations

Legislation of the university faculty governing study periods and examinations is as follows:

1. No final examinations can be given at a time other than the time appearing on the official examination schedule promulgated by the university registrar’s office without prior written permission of the dean of the faculty.
2. No permission will be given, for any reason, to schedule final examinations during the last week of classes or the designated study period preceding final examinations.

3. Permission will be given by the dean of the faculty to reschedule examinations during the examination period itself if requested in writing by the faculty member, but only on condition that a comparable examination also be given for those students who wish to take it at the time the examination was originally scheduled. The faculty member requesting such a change shall be responsible for making appropriate arrangements for rooms or other facilities in which to give the examination. This should be done through the university registrar's office.

4. No tests are allowed during the last week of scheduled classes unless such tests are part of the regular week-by-week course program and are followed by an examination (or the equivalent) in the final examination period.

5. Papers may be required of students during the study period if announced sufficiently far in advance that the student did not have to spend a significant segment of the study period completing them.

6. Faculty can require students to submit papers during the week preceding the study period.

7. Take-home examinations should be given to classes well before the end of the regular term and should not be required to be submitted during study period but rather well into the examination period.

The university policies governing study period and final examinations are:

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

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

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

**EVERN PRELIMINARY EXAMINATIONS**

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

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

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

**Grading Guidelines**

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Quality-Point Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>+4.3</td>
</tr>
<tr>
<td>B+</td>
<td>+3.3</td>
</tr>
<tr>
<td>C+</td>
<td>+2.3</td>
</tr>
<tr>
<td>D+</td>
<td>+1.3</td>
</tr>
<tr>
<td>A</td>
<td>4.0</td>
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<td>B</td>
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<tr>
<td>C</td>
<td>2.0</td>
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<tr>
<td>D</td>
<td>1.0</td>
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<tr>
<td>A-</td>
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<td>B-</td>
<td>2.7</td>
</tr>
<tr>
<td>C-</td>
<td>1.7</td>
</tr>
<tr>
<td>D-</td>
<td>0.7</td>
</tr>
<tr>
<td>F</td>
<td>0.0</td>
</tr>
</tbody>
</table>

This is how a term average is computed:

\[
\text{Term Average} = \frac{\sum \text{Quality-Point Equivalents} \times \text{Credits}}{\text{Total Credits}}
\]

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

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

**S-U GRADES**

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

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

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

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

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

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

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

**Arts and Sciences.** (a) Courses that count toward satisfaction of major requirements should not be taken for an S or U grade unless the department grants permission. (b) Permission of instructor. (c) A minimum of 80 of the 120 hrs. required for the A.B. degree must be in courses for which the student has received letter grades.

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

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

**Hotel.** (a) Maximum of four free-elective credit hours per term. (b) Exceptions are by petition only.

**Human Ecology.** (a) Not part of student's major. (b) May be used in the 15 hours required outside the major in Human Ecology courses. (c) Not part of 39 hours required in humanities, natural sciences, and social sciences. (d) A department may approve S-U grading in specific courses if approved by Educational Policies Committee. (e) Only juniors and seniors may take courses in which both letter grades and S-U are options. (f) Sophomores may take courses in which S-U is offered but letter grades are not offered.
Changes in a grade may be made only if the instructor made an error in assigning the original grade.

**CHANGES IN GRADES**

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

**OFFICIAL TRANSCRIPTS**

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

**University Requirements for Graduation**

The university has only two requirements for graduation that must be fulfilled: the swim test and physical education courses. A student's college determines 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 registrar's office.

**PHYSICAL EDUCATION**

**Classes**

All undergraduate students must complete two terms of work in physical education unless exempted from this requirement for medical or other special reasons or by virtue of advanced standing on admission. Transfer students the requirement is reduced by the number of terms satisfactorily completed, not necessarily including physical education, in a college of recognized standing before entering Cornell. Credit in physical education may be earned by participating in courses offered by the Department of Athletics and Physical Education, participating in an intercollegiate athletic team as a competitor or manager, or performing in the marching band. Physical education is a requirement of the first two terms at Cornell. Students must register for it in each term, except those in which postponements are granted, until the requirement is satisfied. Temporary postponements may be granted on the basis of physical disability, schedule conflicts, or excessive work load (employment exceeding twenty hours a week). The Gannett Health Center can provide certifications based on health, and the financial aid office can provide certifications of employment. Students should see the director or assistant director of Physical Education to establish postponements or waiver of the requirement. Questionable or unusual cases may be resolved by petition to the Faculty Advisory Committee on Athletics and Physical Education.

**Swim Test**

The University Faculty Committee on Physical Education has established a basic swimming and water safety competency requirement for all entering freshman undergraduate students. Normally, the test is given for women in the Helen Newman pool and for men in the Teagle pool as part of their orientation process. The test consists of a feet-first entry into the deep end of the pool and a continuous 75-yard swim using front, back, and optional strokes. Any student who cannot pass the swim test is required to include the course Basic Swimming and Water Safety in his or her program of physical education before electives can be chosen. Students will receive a grade of incomplete in Physical Education until they have passed the swim test or fulfilled the requirement by satisfactory attendance in two terms of Basic Swimming and Water Safety. Students unable to meet the swim requirement because of medical, psychological, or religious reasons must petition the University Faculty Committee on Physical Education for a waiver of the requirement. When a waiver is granted by the Faculty Committee on Physical Education, an alternate requirement is imposed. The alternate requirement substitutes a course in either Advanced First Aid (Emergency Response) or Wellness and Fitness for the original swimming requirement.

**STUDENT RESPONSIBILITIES**

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

**Student Records Policy**

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

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

*Directory information is a category of personally identifiable information that includes name, home address, local address, local telephone listing, dates of attendance at Cornell, major field of study and college attended, previous educational agency or institution attended, participation in officially recognized activities (in athletics, the weight and height of members of athletic teams), degrees earned and awards. Directory
Accordingly, the following student information may be posted:

- Student social security number
- Student identification number
- Course elected
- Grades earned
- Grade point average
- Class rank
- Date of birth
- Place of birth
- Home telephone listing
- Academic and disciplinary actions
- Student or administrative committees
- The most recent student educational records from previous educational agency or institution
- Financial arrangements between the student and the university
- Any other education record containing personally identifiable information

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

### Academic Integrity

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

### PROTECTION OF HUMAN SUBJECTS IN RESEARCH

The University Committee on Human Subjects is the official review board of all university projects that use humans as research subjects. Projects affected by this restriction include, but are not limited to, surveys, questionnaires, studies of existing data, documents, records, in which there are no identifiers, as well as mental and physical tests of human subjects. Requests for student information must be submitted in writing to the Assistant Vice President for Academic Programs and Campus Affairs, 311 Day Hall. All proposals involving human subjects in any category must be submitted to the committee for review. Inquiries, communications, and requests for guidelines should be directed to the committee's Executive Secretary, 120 Day Hall (255-5014). The guidelines are also available on CUINFO under OSP (Office of Sponsored Programs), and at the World Wide Web address www.osp.cornell.edu

### USE OF ANIMALS FOR COURSES

The Cornell University Institutional Animal Care and Use Committee has made the following statement on the use of animals for courses: "Inasmuch as the use of vertebrate animals serves as an invaluable aid in instruction, it is recognized, however, that some students have ethical objections to the use of vertebrate animals in this manner. Courses that use vertebrate animals are identified as such in course descriptions. Students who have concerns about the use of animals in these courses should consult the course instructor for more information about the precise ways in which the animals are used. A set of university guidelines on the use of vertebrate animals in teaching for faculty and students is available from departments in which the courses are offered. A student who is reluctant to voice his or her concerns about animal use in a particular course, or who thinks these concerns have not received proper attention, may seek assistance from the director of the Cornell Center for Research Animal Resources (255-3516)."

### Interdisciplinary Centers, Programs, and Studies

ANDREW D. WHITE PROFESSORS-AT-LARGE

G4 Van Rensselaer Hall (255-0832).

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

### Term Ending in 1995

Doniger, Wendy, historian of religions
Kon, Igor S., sociologist and ethnologist
Levine, Raphael D., chemical physicist
Swaminathan, M. S., natural ecologist
President, National Academy of Sciences, India

### Term Ending in 1996

Lloyd, Geoffrey E. R., Professor of Ancient Philosophy and Science and Master of Darwin College, Cambridge University
Myers, Norman, historian of religions
Rowlinson, John Shipley, chemical engineer

### Term Ending in 1997

Delano, Jack, artist and film maker
Kuspit, Donald, art critic
Nasr, Seyyed Hossein, Islamist

### Term Ending in 1998

Diaconis, Persi, mathematical statistician
Levertov, Denise, poet and critical writer

### Term Ending in 1999

Mitchell, Juliet, psychoanalyst and feminist theorist
Mosse, George, historian
Press, Frank, geophysicist, science and technology adviser
Seeger, Anthony, ethnomusicologist

### Term Ending in 2000

Berry, Michael, physicist
Wilson, William Julius, sociologist

### CENTER FOR APPLIED MATHEMATICS

657 Engineering and Theory Center Building (255-4335)

The Center for Applied Mathematics administers a broadly based interdepartmental graduate program that provides opportunities for study and research over a wide range of the mathematical sciences. Each student develops a solid foundation in analysis, algebra, and methods of applied mathematics. The remainder of the graduate student's program is designed by the student and his or her Special Committee. For detailed information on opportunities for graduate study in applied mathematics, students should contact the director of the Center for Applied Mathematics, 657 Engineering and Theory Center Building.

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

Graduate students in the center take courses related to their program of study that are offered by various departments. Below are listed selected courses in applied mathematics in the main areas of research interest of the center's members. Detailed descriptions of these courses can be found in the listings of the individual departments.
Selected Applied Mathematics Courses

Basic Graduate Courses in Applied Mathematics (and Analysis)
- Math 413–414 Introduction to Analysis
- Math 415–416 Introduction to Algebra
- Math 511–512 Real and Complex Analysis
- Math 521 Measure Theory and Lebesgue Integration
- Math 522 Applied Functional Analysis
- Math 531–532 Algebra
- Math 551 Introductory Algebraic Topology
- Math 515–516 Mathematical Methods in Physics

T&AM 612–613 Methods of Applied Mathematics
T&AM 614–615 Topics in Applied Mathematics

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

Logic and Theory of Computing
- CS 615 Theory of Concurrent Systems
- CS 671 Introduction to Automated Reasoning
- CS 682 Theory of Computing
- CS 715 Seminar in Programming Refinement

Discrete and Numerical Mathematics
- CS 422–522 Parallel Scientific Computing
- CS 521 Matrix Computations
- CS 622 Numerical Optimization and Nonlinear Algebraic Equations
- CS 624 Numerical Methods for Differential Equations
- CS 681 Analysis of Algorithms
- CS 721–722 Advanced Topics in Numerical Analysis
- CS 729 Seminar in Numerical Analysis
- Math 425 Numerical Solution of Differential Equations
- Math 627–628 Seminar in Partial Differential Equations
- Math 655 (also CS 655) Mathematical Foundations for Computer Modeling and Simulation

OR&IE 625 Scheduling Theory
OR&IE 630–631 Mathematical Programming 1 and II
OR&IE 632 Nonlinear Programming
OR&IE 633 Graph Theory and Network Flows
OR&IE 634 Combinatorial Optimization
OR&IE 635 Interior-Point Methods for Mathematical Programming
OR&IE 636 Integer Programming
OR&IE 639 Polyhedral Convexity

Information Communication and Control Theory
- EE 411 Random Signals in Communications and Signal Processing
- EE 425 Digital Signal Processing
- EE 468 Communication Theory
- EE 472 Digital Computer
- EE 521 Theory of Linear Systems
- EE 522 Theory of Nonlinear Systems
- EE 525 Adaptive Filtering in Communication Systems
- EE 526 Advanced Signal Processing
- EE 528 Multisensor Digital Signal Processing
- EE 561 Error Control Codes
- EE 562 Fundamental Information Theory
- EE 565 Communication Networks
- EE 564 Decision Making and Estimation
- EE 565 Queuing Networks
- EE 567 Digital Communication
- EE 573 Optimal Control and Estimation for Continuous Systems
- EE 617 Estimation and Control in Discrete Linear Systems
- EE 677 Artificial Neural Networks

Mathematical Biology
- Bio S 662 Mathematical Ecology
- Stat & Biom 451 Mathematical Modeling of Populations
- Stat & Biom 651 Mathematical Population Studies and Modeling
- Stat 609 & Biom 760 Special Topics in Theoretical and Computational Biology

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

Mechanics and Dynamics
- Chem E 751 Advanced Fluid Mechanics and Heat Transfer
- Chem E 732 Mass Transfer
- Chem E 751 Mathematical Methods of Chemical Engineering Analysis
- Chem E 753 Analysis of Nonlinear Engineering Systems: Stability, Bifurcation, and Continuation
- EE 681 (also A&EP 761) Kinetic Theory
- M&E 601 Foundations of Fluid Dynamics and Aerodynamics
- M&E 602 Fluid Dynamics at High Reynolds Numbers
- M&E 732 Analysis of Turbulent Flows
- M&E 733 Stability of Fluid Flow
- M&E 734 Turbulence and Turbulent Flow
- M&E 736 Computational Aerodynamics
- M&E 737 Computational Fluid Mechanics and Heat Transfer
- T&AM 570 Intermediate Dynamics
- T&AM 578 Nonlinear Dynamics and Chaos
- T&AM 579 Vortices and Waves in Elastic Systems
- T&AM 671 Advanced Dynamics
- T&AM 672 Celestial Mechanics (also Astro 579)
- T&AM 673 Mechanics of the Solar System (also Astro 571)
- T&AM 675 Nonlinear Vibrations
- T&AM 751 Continuum Mechanics and Thermodynamics
- T&AM 752 Nonlinear Elasticity
- T&AM 776 Applied Dynamical Systems

Probability and Statistics
- EE 562 Fundamental Information Theory
- EE 563 Communication Networks
- EE 564 Decision Making and Estimation
- EE 664 Foundations of Inference and Decision Making
- Math 571–572 Probability Theory
- Math 573 Experimental Design and Multivariate Analysis
- Math 574 Probability and Statistics
- Math 575 Sequential Analysis, Multiple Decision Problems
- Math 577 Nonparametric Statistics
- Math 670 Topics in Statistics
- Math 674 Multivariate Analysis
- Math 675 Statistical Decision Theory
- Math 677–678 Stochastic Processes

OR&IE 561 Queuing Theory and Its Applications
OR&IE 563 Applied Time-Series Analysis
OR&IE 650 Applied Stochastic Processes
OR&IE 651 Applied Probability
OR&IE 662 Advanced Stochastic Processes
OR&IE 663 Time-Series Analysis
OR&IE 665 Advanced Queuing Theory
OR&IE 670 Statistical Principles
OR&IE 671 Intermediate Applied Statistics
OR&IE 674 Design of Experiments
OR&IE 675 Statistical Analysis of Discrete Data
OR&IE 676 Statistical Analysis of Life Data

Robotics
CS 462 Robotics and Machine Vision
CS 661 Robotics
CS 662 Robotics Laboratory
CS 762 Robot Cafe

Theoretical/Mathematical Physics/Chemistry
Chem 792 Molecular Collision Theory
Chem 793 Quantum Mechanics I
Chem 794 Quantum Mechanics II
Chem 796 Statistical Mechanics
Chem 798 Special Topics in Physical Chemistry
EE 407 Quantum Mechanics and Solid State Physics
EE 412 Applied Solid State Physics
Phys 553–554 (Astro 509–510) General Relativity
Phys 572 Quantum Mechanics I
Phys 574 Quantum Mechanics II
Phys 561 Classical Electrodynamics
Phys 562 (Chem 796) Statistical Mechanics
Phys 563 Statistical Physics
Phys 651 Advanced Quantum Mechanics
Phys 652 Quantum Field Theory

CENTER FOR THE ENVIRONMENT
Rice Hall (255-7535)
The Center for the Environment (CFE) is committed to research, teaching, and outreach focused on environmental issues, with the goals of enhancing the quality of life, encouraging economic vitality, and promoting the conservation of natural resources for a sustainable future. The CFE historically includes several well-established programs, each headed by a program director and typically staffed by research and outreach professionals working with other Cornell faculty and staff in their respective programmatic disciplines. These institution based programs of the center include the following:
(1) The Cornell Laboratory for Environmental Applications of Remote Sensing (CLEAR) promotes, facilitates, and conducts research and extension programs in the areas of remote sensing, geographic information systems (GIS), and resource inventory, (2) the Cornell Waste Management Institute (CWMI) promotes interdisciplinary programs that integrate...
In this curriculum, students will have the opportunity to enhance or build upon their undergraduate education and training by taking graduate courses in the fields of Natural Resources, Agricultural Economics, Soil, Crop and Atmospheric Sciences, Agricultural and Biological Engineering, and Development Sociology. In addition, all students will enroll in an interdisciplinary common core of courses including: science and technology of environmental control, organizations, environmental accounting, environmental regulation, and an intensive field project. These common courses are intended to provide students with the knowledge, skills, and insights that will enable them to function effectively as managers at various levels in the private, public, and voluntary sectors. Recognizing the diverse backgrounds of students who will participate in this program, each graduate will have the opportunity to develop a unique set of skills to offer potential employers.

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

A new undergraduate program in the Science of Earth Systems, available to students in the College of Agriculture and Life Sciences, Arts and Sciences, and Engineering, highlights the study of the Earth as one of the outstanding intellectual challenges in modern science and as the necessary foundation for the future management of our planet. The curriculum content encompasses Cornells strengths across a broad range of earth and environmental sciences to provide students with a rigorous scientific foundation for the study of the Earth system. The program is described in more detail on page 21.

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

Because courses relating to the environment are not indexed by that title, interested students should check listings under the following sections in addition to the departments mentioned above: Communication, Education, Entomology, Food Science, International Agriculture, Biology and Society, Chemistry, Economics, Government, History, Physics, and Anthropology Studies. A brochure listing undergraduate environmental course offerings is available from the Center.
Cognitive Studies is a new and rapidly growing field of study that focuses on the nature and representation of knowledge. It approaches the study of perception, action, language, and thinking from several perspectives— theoretical, experimental, and computational — with the aim of gaining a better understanding of human cognition and the nature of intelligent systems. The comparison between human and artificial intelligence is an important theme, as is the nature of mental representations and their acquisition and use. Cognitive studies has drawn primarily from the disciplines of computer science, linguistics, philosophy, and psychology. In the College of Arts and Sciences the field of cognitive studies is primarily represented by faculty in these departments, as well as in mathematics. It is also represented by faculty in the Department of Human Development and Family Studies (College of Human Ecology), in the Section of Neurobiology and Behavior (Division of Biological Sciences), in the Department of Education (College of Agriculture and Life Sciences), and in the Johnson Graduate School of Management.

Undergraduate Programs
An undergraduate concentration in cognitive studies in the College of Arts and Sciences provides a framework for the design of structured, individualized programs of study in this growing interdisciplinary field. Such programs of study are intended to serve as complements to intensive course work in a single discipline as represented in an individual department. For further information on the undergraduate program, see "Cognitive Studies Concentration" in the College of Arts and Sciences section. Contact Sue Wurster: 255–6431 or cogst@cornell.edu.

Graduate Programs
At the graduate level Cornell offers a graduate field minor in cognitive studies. Cornell's unique program of graduate training, which seeks to tailor an optimal program of study and research for each student, fosters interdisciplinary committees. It is the norm for students interested in cognitive studies to combine faculty members from such departments as Philosophy, Computer Science, Modern Languages and Linguistics, or Psychology on common committees. For further information on the graduate Field of Cognitive Studies, contact Barbara Lust, graduate field representative, NG28 Van Rensselaer Hall (telephone: 607/255-0829), or 273A Uris Hall, Office of Cognitive Studies, 255–6431, cogst@cornell.edu.

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

Cornell Abroad
474 Uris Hall 607/255-6224, fax 607/255-8700, e-mail: CUAbr@cornell.edu
Study abroad is an integral part of a Cornell education. We live in an increasingly global society in which knowledge, resources, and authority transcend national and regional boundaries. To help students develop the knowledge, skills, and attitudes necessary for global citizenship in the twenty-first century, Cornell Abroad offers a broad range of international study opportunities that reflect the fundamental educational goals and objectives of the university. Study abroad is a continuous experience with study on campus, enabling students to make regular progress toward the degree, at a cost that is generally no greater than for study on campus.
Qualified students study abroad through programs administered by Cornell and other American institutions, and by enrolling directly in foreign universities. Among the many study abroad programs available, students select programs with thoughtful planning and apply with the approval of their colleges and faculty advisers. In all cases, students must apply through Cornell Abroad, whose staff services the planning and application process.

Locations Abroad
Cornell students majoring in a broad array of fields in all seven undergraduate colleges regularly study in approximately 40 countries. The following list includes those programs chosen most frequently by students with college approval; those locations preceded by an asterisk (*) are programs run directly by Cornell.

Africa
Botswana, Cameroon, Kenya: School for International Training;
Ghana: University of Ghana (through the Council of International Educational Exchange, CIEE);
Kenya: East Africa Program (Friends World Program); Kenya Semester Program (St. Lawrence University);
Asia

China: Peking and Nanjing Universities through CIEE;

Hong Kong: Chinese University of Hong Kong;

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

Japan: Kyoto Center for Japanese Studies through a Stanford University-led consortium, and various other university programs;

Korea: Yonsei University;

*Nepal: Cornell-Nepal Study Program (Samyukta Adhyayan Karikam Nepal) at Tribhuvan University;

Thailand: Khon Kaen University (CIEE);

Vietnam: University of Hanoi (CIEE)

Australia

Australia National University, Canberra; University of Sydney; University of New South Wales, Sydney; University of New England, Armidale; The University of Wollongong; University of Western Australia, Perth; School for International Training

Europe

Denmark: Denmark's International Study Program (DIS);

*France: EDUCO (Cornell and Duke in Paris) at Université de Paris VII, Paris I, Institut d'Études Politiques de Paris (Sciences Po); Critical Students Program at the University of Paris (CIEE);

*Germany: Cornell program at the University of Hamburg; spring engineering semester at the Technical University of Hamburg, Harburg;

*Greece: Cornell program at the Athens Centre;

Hungary: Budapest University of Economics (CIEE), Technical University of Budapest (Seminar in Mathematics);

Ireland: University of Limerick, Trinity College, Dublin;

Italy: Bologna Cooperative Studies Program, Cornell College of Art, Architecture and Planning Program in Rome; Intercollegiate Center for Classical Studies in Rome;

Russia: St. Petersburg University (CIEE);

*Spain: Cornell-Michigan-Penn program at the University of Seville;

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

*Switzerland: Cornell program at the University of Geneva and affiliated institutes;

United Kingdom: University of Bristol; Cambridge University; University of Edinburgh; University of Manchester; Oxford University; University of Reading; University of Sussex; University of Warwick; University of York; University of London: King's College, University College, Imperial College of Science and Technology, and the London School of Economics and Political Science, Queen Mary

Westfield College, School of Oriental and African Studies, School of Slavonic and East European Studies.

Latin America, Central America, and the Caribbean

Costa Rica: School for Field Study;

Ecuador and Jamaica: Partnership for Service Learning;

Honduras: Escuela Agrícola Panamericana (Zamorano);

Mexico: Instituto Tecnológico y de Estudios Superiores de Monterrey; Universidad de las Americas-Puebla (UDLA); Universidad Iberoamericana;

Middle East

Egypt: American University in Cairo;

Israel: Ben-Gurion University; Development Study Center, Rehovot; Haifa University; Hebrew University of Jerusalem;Tel Aviv University;

Morocco: School for International Training

Other Locations

Cornell students are not limited to the locations listed above. In recent years, they have also studied in Argentina, Austria, Brazil, Colombia, Czech Republic, Dominican Republic, India, New Zealand, the Philippines, Poland, Puerto Rico, Turkey, Venezuela, and elsewhere.

Who Studies Abroad

Students from all seven undergraduate colleges and from all major fields are eligible to study abroad; they are generally expected to have a cumulative grade point average of 3.0 or above. More than 900 undergraduates studied abroad last year. Because the colleges usually require that students complete at least sixty hours of undergraduate credit on the Ithaca campus, students who transfer to Cornell as juniors generally cannot count student abroad credit toward their Cornell degree.

When Students Study Abroad and for How Long

Students may study abroad their sophomore, junior, or senior year. The junior year is the traditional choice, but second semester sophomore year or first semester senior year is increasingly popular. To ensure preparation, it is important to begin planning for study abroad in the freshman year. Although semester-long programs are usually available, academic year programs are highly recommended, especially for students enrolling in non-English speaking universities.

Application Process

Applications for all study abroad programs—Cornell programs, as well as those administered externally by other institutions in this country and abroad—are available in the Cornell Abroad Office, 474 Uris Hall, where students are encouraged to consult the library of study abroad materials and to ask preliminary questions of the staff. Students meet with the study abroad advisers in their colleges to choose programs that fit the needs of their degree programs. Each applicant completes a one-page written statement of academic purpose outlining goals for study abroad and the program of study that will be followed. Applications are signed by both college study abroad and faculty advisers and are returned to the Cornell Abroad office, with the exception of Human Ecology and Industrial and Labor Relations students whose applications are submitted to their college for forwarding to Cornell Abroad. Cornell Abroad reviews all applications and forwards them to external programs as necessary. All students who wish to receive academic credit for study abroad must apply through Cornell Abroad and their undergraduate college. The deadline for all applications to study abroad in the spring 1996 semester is October 15, 1995; to study abroad in the fall 1996 semester and/or the 1996-97 academic year, the deadline is February 15, 1996 for programs sponsored externally; for the programs administered directly by Cornell Abroad in Athens, Geneva, Hamburg, Nepal, Paris, and Seville, the date is March 1, 1996. Note that to study at Oxford and Cambridge for the full 1996-97 academic year, the deadline is November 1, 1995 and that for all other British universities, students should inquire at Cornell Abroad. Externally sponsored programs announce application deadlines at varying dates; students are advised to apply as early as possible. Some programs admit students on a rolling basis from very early in the semester.

Registration, Credit Transfer, and Grades

Students who apply through Cornell Abroad to programs approved by their colleges, as outlined above, remain registered at Cornell during study abroad. They are eligible for financial aid and receive full academic credit for pre-approved courses of study completed with satisfactory grades. Students enroll for a full load of courses abroad, according to the standards of the foreign institution and normally receive 30 credits per year or 12-20 credits per semester. The colleges review coursework taken abroad and make the final decisions concerning credit transfer and distribution. When study abroad credit has been transferred, the transcript will indicate the names of the courses taken, the credits earned, and the grades received. The foreign grades are not translated into the Cornell/ American grading system, nor are they averaged into the Cornell grade point average.

Foreign Language Requirements

Study abroad programs in non-English-speaking countries that offer direct enrollment in universities generally require at least two years or the equivalent of college-level language study. Students should make firm plans for any requisite language courses early in their freshman year. English-language programs are increasingly available in non-English-speaking countries—for example, Belgium, Denmark, Egypt, France, Hong Kong, Indonesia, Israel, Italy, Japan, Korea, Netherlands, People's Republic of China, and Sweden. Whenever Cornell students study in a non-English-speaking country in an English-language program, they are required to take at least one language course as part of their course of study. Students are advised to consult with their college study abroad advisers about relevant language preparation.
Housing Arrangements
Study abroad programs generally provide housing in the homes of local residents, in university halls of residence, or in apartments. Cornell Abroad will advise students of the arrangements that are available and most appropriate to their individual needs.

Costs
Students studying abroad on Cornell programs in Athens, Geneva, Hamburg, Nepal, Paris, and Seville in 1995–96 pay a comprehensive fee of $11,895 per semester, which covers, tuition, housing, orientation, program field trips and excursions.

Students studying abroad on all other programs in 1995–96 pay the tuitions and other costs charged by their programs, and a Cornell study abroad fee of $2,350 per semester. The fee covers the direct and indirect costs of study abroad to the university, including financial aid for study abroad students.

Financial Aid
All students who are accepted for study abroad during the academic year or semester, having completed through Cornell Abroad, are eligible for financial aid, consistent with general university policy; this applies to all programs, whether sponsored by Cornell or externally.

Security Abroad and Related Issues
The decision to study in a particular region of the world must be made by each student and his or her family in light of their own interpretation of current events. The director and staff stay in close contact with representatives abroad and receive information regarding rapidly changing political situations through the U.S. Department of State Office of Citizens Emergency Services and other agencies. As long as the State Department does not restrict travel by U.S. citizens, Cornell Abroad does not recommend limitations on student plans for study abroad. Cornell Abroad will do everything possible to notify students immediately that they should defer plans if official travel restrictions are issued. Nothing is as important as student security and well-being.

Responsibility for a decision to withdraw from a program or return home early rests with the individual and his or her family. There can be no guarantee of credit for students who withdraw from programs sponsored by colleges and universities other than Cornell; they are advised to inquire about those institutions’ policies regarding the completion of academic work and the potential financial implications of a premature departure. In the event of a disrupted semester, refunds of tuition and fees, and the appropriate number of credits to be awarded will be reviewed by Cornell and affiliated institutions on a case-by-case basis. Most institutions sponsoring study abroad programs strive to facilitate student completion of academic programs even under unusual circumstances and have tuition refund policies that contain a prorated formula.

Sources of Information and Advice Concerning Study Abroad
Cornell Abroad (474 Uris Hall): Ursbin J. DeWinter, adjunct associate professor of romance studies, director; Beatrice B. Szekely Ph.D., associate director; Elizabeth R. Okhiro, Student Services; Kathy Lynch, accounts coordinator. Rae Ann Mathewson, administrative assistant. The Cornell Abroad library contains an extensive collection of university catalogs, study abroad program brochures, course syllabi and evaluations, books, videotapes, and some information on the summer study, and work abroad. In the early weeks of every semester, faculty, students, and staff discuss programs in a series of information meetings that is announced in the Cornell Daily Sun.

College Study Abroad Advisers
Agriculture and Life Sciences: Dr. Donald Burgeitt, director, Student Services, 140 Roberts Hall; Architecture, Art, and Planning: Phyllis Thibodeau, executive assistant (Rome Program), 129 Ives Hall; Art and Sciences: Dr. Barbara Lanz, assistant dean, International Programs, 55 Goldsmith Smith Hall; Engineering: Professor Richard Lance, 322 Thurston Hall; Hotel Administration: Professor Russell Bell, 545C Statler Hall; Human Ecology: Dr. Mary Rhodes, registrar, N101 Martha Van Rensselaer; Industrial and Labor Relations: Laura Lewis, student development specialist, 101 Ives Hall.

CORNELL-IN-WASHINGTON PROGRAM
131 Sage Hall (255-4090)
Cornell-in-Washington is a university-wide program that offers students from all colleges within the university an opportunity to earn full academic credit for a semester of study in Washington, D.C. The program is designed to give students a chance to take advantage of the rich resources of the national capital. Washington, as the center of much of the nation’s political energy, is an ideal place to study American public policy and the institutions and processes through which it is formulated and implemented. At the same time, Washington’s rich collection of libraries, museums, theaters, and art galleries, offers an opportunity to explore American history, literature, art, and the full range of the American humanistic tradition. The Cornell-in-Washington Program offers two study options: 1) studies in public policy; and 2) studies in the American experience. Students take courses from Cornell faculty, conduct individual research projects, and work as externs in the Washington community.

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

The Cornell-in-Washington Program is open to qualified juniors and seniors from all colleges, schools, and divisions of the university. Students enrolled in courses which involve a major research project often carried out in conjunction with an externship. Students also select one or two other seminars from such fields as government, history, economics, history of art, literature, natural resources, and social policy. All seminars are taught by Cornell faculty and carry appropriate credit toward fulfillment of major, distribution, and other academic requirements. In addition, students work as externs with congressional committee offices, executive branch agencies, interest groups, and research institutions, and other organizations involved in the political process and public policy.

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

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

Applications
Application forms are available from the Cornell-in-Washington office at 131 Sage Hall. Applications should be submitted the semester prior to participation.

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

CORNELL INSTITUTE FOR PUBLIC AFFAIRS
132 Sage Hall (255-8018)
Cornell’s Institute for Public Affairs (CIPA) seeks to provide students with an understanding of the political processes through which issues, problems, and policies are formulated; the economic bases for government action in a market economy, including both micro- and macroeconomic techniques and problems; and the comparative and historical contexts and development of governmental programs. The program intends to provide familiarity with public budgets, finance, and the regulatory process, as well as a thorough knowledge of the behavior of both public and private organizations and their management. It also aims to develop competence in the qualitative and quantitative methods needed to analyze and evaluate programs and policies and sensitivity to the moral and ethical dimensions of policy questions.
The two-year Master of Public Administration program consists of sixteen courses; students are required to take four courses per term for two years. Students with unusually strong backgrounds in required course areas may be granted advanced standing. Special arrangements will be made for students who require additional preparation in required areas.

In consultation with a CIPA faculty adviser, each student uses electives to develop an area of concentration. Elective courses and research opportunities may be taken within the program or in any department or college in the university. Students have considerable freedom to design specializations that suit their interests and career goals. Potential areas of concentration include among others: environmental policy, health and human services, international relations, area studies, international development, labor/management relations, public policy analysis and planning, and science and technology studies.

All students are required to develop and complete a CIPA thesis. This project, under the supervision of two faculty members, should define and analyze a specific policy problem and offer recommendations for future programs and policies in the area. The CIPA thesis allows students to refine and integrate analytical and intellectual skills they have acquired as well as to demonstrate their capacity to understand and deal with real problems facing public agencies.

**Application.** Applicants are required to submit GRE general test scores.

**Financial Support.** The budgetary resources of the program are extremely limited, and financial aid will be awarded only on the basis of unusual merit and clearly documented need. Requests should be made directly in writing to Cornell Institute for Public Affairs, 132 Sage Hall, Ithaca, N.Y. 14853-6201.

**CORNELL PLANTATIONS**

One Plantations Road (255-3020)

A place of exceptional diversity and opportunities, Cornell Plantations comprises the university's botanical garden, arboretum, and natural areas. Its nearly 3,000 acres include the woodlands and a bordering campus, as well as 11 specialized gardens and the 150-acre arboretum that features a field flower meadow and trees and shrubs native to New York State. Cornell Plantations provides unique outdoor laboratories and plant collections for Cornell's academic programs and research in disciplines that include agriculture, biology, ecology and systematics, environmental and ornamental horticulture, fruit and vegetable science, geology, landscape architecture, natural resources, plant breeding, and plant pathology. While much of Cornell Plantations' resources are on or near campus, several thousand acres in and around Tompkins County preserve quality examples of native vegetation and rare plants and animals. The lands include bogs, fens, glens, swamps, wet and dry forests, meadows, and dunes. Arrangements to use these areas for classes and research can be made by calling Cornell Plantations.

For those seeking less-strenuous experiences, Cornell Plantations offers relaxation, rejuvenation, and inspiration. The vast open spaces provide room to breathe; the intimate gardens shelter you. Visitors always discover surprises and learn something new in the gardens, which feature herbs, flowers, heritage and modern vegetables, international crops, weeds, alpine and rock garden plants, peonies, poisonous plants, groundcovers, rhododendrons, and plants native to the Cayuga Lake Basin.

Students are encouraged to volunteer as photographers, authors, tour guides, and gardeners. Maps, information, publications, and class brochures (for noncredit classes and workshops) are available in the Garden Gift Shop in the Lewis Headquarters Buildings at the botanical garden. Non-credit courses in horticulture, plant science, geology, free-hand drawing, and other natural history topics are offered throughout the year.

**PROGRAM ON ETHICS & PUBLIC LIFE**

119 Stimson Hall (255-8515)

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

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

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

**EPL Core Courses**

PHIL 247 Ethics and Public Life

PHIL 254/GOVT 254 Global Thinking

PHIL 342 Law, Society, and Morality

PHIL 543 Practical Obligation and Civil Disobedience

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

GOVT 412 Voting and Political Participation

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

GOVT 468/Phil 368 Global Climate and Global Justice

GOVT 491/691 Conflict, Cooperation, and the Norm: Ethical Issues in International Affairs

**Related Courses**

CEH 356 Economics of Welfare Policy

CRP 642 Critical Theory and the Foundations of Planning Analysis

ENGR 360/S&T 360 Engineering Ethics

ILR 482 Ethics at Work

ILR 488 Liberty and Justice for All

LAW 668 Lawyers and Clients

LAW 744 Lawyers and the Legal Profession

Henry Shue, director, 119 Stimson Hall, 255-8515. Henry Shue, Wyn and William Y. Hutchinson Professor of Ethics & Public Life, Kathryn Abrams, Associate Professor of Ethics & Public Life and Professor of Law.

**LATINO STUDIES PROGRAM**

211 Sage Hall (255-3197)

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

**1995–96 Course Offerings**

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

HSS 280/ASR 280: Race in American Society

HSS 370: Social Welfare as a Social Institution

ILR 469: Immigration and the American Labor Force

SOC 265: Hispanic Americans

SPAN 204: Intermediate Composition and Conversation

SPAN 366/LING 366: Spanish in the United States

SPAN 311–312: Advanced Composition and Conversation

SPAN 332: The Modern Drama in Spanish America

SPAN 346: Hispanic Caribbean Culture and Literature

SPAN 390: Fiction of Modern Hispanic Women

SPAN 396: Modern US-Hispanic Prose Fiction

SPAN 397: Colombian Literature

SPAN 392: Latin American Women Writers

LSP/SPANL 105 FWS: Paradise Lost: Biculturalism in America

LSP/SPANL 106 FWS: Searching for Self in Hispanic fiction

LSP/SPANL 107 FWS: The Literature of U.S. Hispanic/Ethnic Women Writers
LING 113 FWS: Two Worlds—Dos Mundos
LSP/SPANL 119 FWS: Letters from el Barrio: A Sense of Place in Hispanic American Fiction
LSP/SPANL 125 FWS: The City in Hispanic Novels
LSP/SPANL 126 FWS: The Complex Fate: Self-Identity and Conflict in the United States Hispanic Literature
LSP/SPANL 210: Introduction to Hispanic American Studies
LSP 304/SPANL 304: Hispanic American Poetry
LSP/ARTH 312/SPANL 314: Hispanic Aesthetics: Visual Vernacular
LSP/HIST 317: Transnational Communities: Latin Americans in the United States
LSP 402/SPANL 402/THETR 402: Latin American and Latino Video

PROGRAM IN REAL ESTATE
219 West Sibley Hall (255-1748)

The two-year Master of Professional Studies (MPS) degree in Real Estate is an interdisciplinary degree program that combines courses from nearly every college at Cornell University. The degree is designed for aspiring real estate professionals who are in the initial or early stages of their careers. Two entities provide support for the degree program. The Program in Real Estate exists at Cornell University to serve as the integrating organizational unit for financial management and administration of academic real estate activities on and off campus. The Field of Real Estate has faculty members from five different colleges (Architecture, Engineering, Hotel, Human Ecology, and Management) that is directly involved in the design and administration of the real estate curriculum.

The professional study of real estate is concerned with the finance, exchange, development, management, marketing, and many other aspects of the real estate business. Real estate professionals also bring an understanding of the long-range social, political, ethical, and environmental implications of decisions about real estate. The 60 credit hours of course work needed to earn the degree provide a comprehensive and lasting foundation for professional careers in real estate.

Core courses in financial management, economics, real estate finance and investment, market analysis, project development, housing economics, regulation, and environmental issues will be required during the first year of study. During the second year, students take additional core courses and elective courses in their areas of concentration. The 60 credit hours of course work needed to earn the degree provide a comprehensive and lasting foundation for professional careers in real estate.

The SES Curriculum

The SES Curriculum includes strong preparation in mathematics, physics, chemistry, and biology for the freshman and sophomore years. In addition, students take two-credit SES Colloquium, which is designed to inform students about the field and to provide a sense of community for SES students and faculty from the several colleges. In the junior and senior years, students take a set of common SES core courses and an additional set of advanced disciplinary or interdisciplinary courses that build on the basic sequences.

The SES program provides a strong preparation for graduate school in any one of the: Earth systems sciences and related engineering fields, in addition to preparing students for a wide variety of careers in environmental work with the B.S. degree. An alternate track could be designed for students who are interested in entering fields such as environmental law and policy with a strong scientific understanding of the environment.

The required courses for the program are summarized as follows:

1. MATH 191, 192, 293, 294 (or MATH 111, 112, 221, 222);
2. Four courses in chemistry and physics:
   - Option A: Three calculus-based physics courses plus one chemistry course (e.g., PHYS 112-213-214 and CHEM 211), or
   - Option B: Two calculus-based physics courses plus two chemistry courses (e.g., PHYS 207-208 and CHEM 207-208);
3. Three biology courses: BIO G 101-103-104 (or 105-106) and BIOFS 261;
4. Colloquium in the Science of Earth Systems (SES 101 or 102);
5. Four core courses in the Science of Earth Systems (SES 301, 302, 401, and 402);
6. Four intermediate to advanced-level courses approved by the SES Curriculum Committee. These courses should build on the core sequence and include upper-level courses with prerequisites in the basic sciences and mathematics. The selection of these courses will be used to prepare for careers or graduate study in specific environmental science disciplines such as geology, hydrological sciences, biogeochemistry, ecology, oceanography, and atmospheric sciences.

Effective combinations of these disciplines are also possible.

SES Course Descriptions

Note: Class meeting times are accurate at the time of publication. If changes are necessary, new information will be provided as soon as possible.

SES 101-102 Science of Earth Systems Colloquium (also ABEN 120-121, GEO 123-124, SCAS 101-102) 101, fall; 102, spring. 2 credits each term.

SES 301 Climate Dynamics (also ASTRO 331 and SCAS 331) Fall, 4 credits. Prerequisite: Math 112 or 112 or equivalent. Lecs, M W F 11:15; rec, T 1:25. K. Cook, P. Giersch.

The purpose of this course is to develop a physical understanding of the climate system. Processes that determine climate and contribute to its change are discussed, including comparisons with the climates of other planets. Applications to problems of climate change and variability include the astronomical theory of ice ages, greenhouse warming, the ozone hole, African drought, and Amazonian deforestation.

SES 302 Evolution of the Earth System (also GEOL 302 and SCAS 332) Spring, 4 credits. Prerequisites: Math 112 or 112 and Chem 207 or equivalent, or instructor's approval. Lecs, M W F 11:15; recitation TBA. B. Isaac, W. White, W. Allmon.
The co-evolution of life and the earth system over three time scales: origin of the earth and life and earth’s early history; plate tectonics, continental drift and climate changes during the past billion years; and mountain building, continental drift and climate changes during the past ten million years. Introduction to methods of interpreting the paleontological, geochronological, and tectonic information preserved in the rock record.

SES 401 Physics of Earth Systems  
(Under development for Fall 1996).  
3 credits.  
Emphasis on the development of the tools of fluid and solid mechanics that are necessary for advanced study in such areas as geodynamics, hydrology, oceanography, and atmospheric sciences.

SES 402 Biogeochemistry  
(Under development for the Spring 1997 semester).  
4 credits.  
The roles of major and minor elements both globally and in selected ecosystems will be studied. In addition, a component discussing solid earth geochemistry will be included.

Advising  
Students will be matched with an SES adviser according to the student’s interests and the college in which the student is enrolled. The adviser will assist the student in selecting the four upper-level courses required by the SES Program. Several example curricula have been designed as guides for students in each of the colleges, to demonstrate how the college and SES Program requirements are met.

Entering the SES Program  
Transfers into the program during the freshmen and sophomore years will be relatively straightforward for students who have already begun a calculus sequence and have taken courses in the basic sciences. Other interested students, either junior- or senior-level science and math students or those from other fields, should contact an SES adviser to explore the possibility of entering the SES program.

For more information, contact  
College of Agriculture and Life Sciences:  
K. H. Cook (Soil, Crop, and Atmospheric Sciences), B. Howarth (Biological Sciences), J. Partlange (Agricultural and Biological Engineering), R. J. Wagener (Soil, Crop, and Atmospheric Sciences);  
College of Arts and Sciences:  
P. Giersch (Astronomy), B. L. Isacks (Geological Sciences);  
College of Engineering:  
W. Brutsaert (Civil and Environmental Engineering), B. L. Isacks (Geological Sciences), M. Kelley (Electrical Engineering), J. Partlange (Agricultural and Biological Engineering).

STATISTICS CENTER  
482 Caldwell Hall (255-8086)  
The Cornell Statistics Center coordinates university-wide activities in statistics and probability at the graduate and research level. Students interested in graduate study in statistics and probability can apply to the field of statistics or to one of the other graduate fields of study that offer related course work.

Students in the field of statistics plan their graduate program with the assistance of their Special Committee. For detailed information on opportunities for graduate study in statistics and probability, students should contact the director of the Statistics Center, 482 Caldwell Hall.

The many different programs available to graduate students within the field of statistics can be broadly grouped as follows: biometry, biostatistics, economic and social statistics, operations research, probability theory, sampling theory, statistical computing, statistical design, statistical theory, and stochastic processes and their applications.

The following list contains selected courses in statistics and probability of interest to graduate students in the field of statistics.

Economics  
519 Econometrics I  
520 Econometrics II  
519 Advanced Econometrics in Econometrics I  
620 Advanced Topics in Econometrics II

Electrical Engineering  
411 Random Signals  
468 Communication Systems I  
561 Error Control Codes  
562 Fundamental Information Theory  
563 Communication Networks  
564 Decision Making and Estimation  
567 Communication Systems II  
577 Artificial Neural Networks  
663 Advanced Topics in Information Theory  
664 Foundations of Probability

Industrial and Labor Relations  
310 Design of Sample Surveys  
312 Applied Regression Methods  
410 Techniques of Multivariate Analysis  
411 Statistical Analysis of Qualitative Data  
510-511 Introductory Statistics for the Social Sciences  
610 Seminar in Modern Data Analysis  
611 Statistical Computing  
612 Statistical Classification Methods  
613 Bayesian and Conditional Inference  
614 Structural Equations with Latent Variables  
711 Sensitivity Analysis in Linear Regression  
712 Theory of Sampling  
713 Empirical Processes with a Statistical Application  
714 Modern Distribution Theory

Mathematics  
471 Basic Probability  
472 Statistics  
571-572 Probability Theory  
573 Multivariate Analysis  
574 Mathematical Statistics  
670 Topics in Statistics

Operations Research  
560 Queueing Theory and Its Application  
562 Inventory Theory  
563 Applied Time Series Analysis  
575 Experimental Design II  
577 Quality Control  
580 Design and Analysis of Simulated Systems  
630-631 Mathematical Programming I and II  
650 Applied Stochastic Processes  
651 Applied Probability  
662 Advanced Stochastic Processes  
663 Time-Series Analysis  
665 Advanced Queueing Theory  
670 Applied Statistics  
671 Intermediate Applied Statistics  
674 Design of Experiments  
676 Statistical Analysis of Life Data  
678 Asymptotic Methods in Statistics

680 Simulation  
769 Selected Topics in Applied Probability

Statistics and Biometry  
408 Theory of Probability  
409 Theory of Statistics  
417 Matrix Algebra  
451 Mathematical Modeling of Populations  
601-604 Statistical Methods I, II, III, and IV  
605 Applied Regression Analysis  
606 Sampling Biological Populations  
607 Nonparametric and Distribution-Free Statistical Methods  
642 Advanced Mathematical Population Studies and Modeling  
651 Mathematical Population Studies and Modeling  
662 Mathematical Ecology  
681 Topics in Environmental Statistics  
697 Special Problems in Statistics and Biometry  
717 Linear Models  
718 Variance Components  
795 Statistical Consulting

PROGRAM IN COMPARATIVE AND ENVIRONMENTAL TOXICOLOGY  
213 Rice Hall (255-8008 or 255-2808)

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

Graduate Studies  
The major in the graduate Field of Environmental Toxicology promotes training leading to the M.S. or Ph.D. degrees. It provides both breadth and depth in environmental toxicology and related disciplines. The program offers a combination of research and didactic training that is designed to prepare students for solving the problems of modern toxicology. Specialization tracks include cellular and biochemical toxicology, nutritional and food toxicology, ecotoxicology and environmental chemistry, and risk assessment, management, and public policy. Research of the faculty associated with the program is focused on the interactions of drugs, pesticides, and other potentially hazardous environmental agents with a wide variety of living organisms (including humans) and with the ecosystems with which these organisms are associated.

Courses  
Courses in environmental toxicology are cosponsored by the university academic departments and are open to all graduate students and to those undergraduates who have permission of the instructor. The titles and numbers of these courses are listed below, and details of the requirement are provided elsewhere in the catalog under the listings of the cosponsoring department. Further information concerning the program and the development of new courses may be obtained through a graduate faculty representative, 213 Rice Hall (telephone: 255-8008).
Tox 370 Pesticides and the Environment (Entomology 370)
Tox 437 Oncogenic Cancer Viruses (Biological Sciences 437)
Tox 528 Pharmacology (Veterinary Medicine 528)
Tox 607 Ecotoxicology (Natural Resources 607)
Tox 610 Introductory Chemical and Environmental Toxicology (Food Science 610)
Tox 611 Molecular Toxicology (Nutritional Sciences 611)
Tox 621 Clinical Veterinary Toxicology (Veterinary Medicine 621)
Tox 640 Principles of Toxicological Pathology (Veterinary Medicine 640)
Tox 660 Safety Evaluation in Public Health (VetPR 660)
Tox 680 Hazardous Waste Toxicology
Tox 690 Insect Toxicology and Insecticidal Chemistry (Entomology 690)
Tox 698 Current Topics in Environmental Toxicology (Nutritional Sciences 700, NutRies 988, Ag & Bio Eng 988)
Tox 702 Seminar in Toxicology
Tox 751 Professional Responsibilities of Toxicologists (Biological Sciences 751)
Tox 899 Master’s Thesis and Research
Tox 999 Doctoral Thesis and Research

VISUAL STUDIES
Studio G, 726 University Ave. (255-6770) or Sh0A Center for Theatre Arts (254-2782)
Visual Studies as a distinct area of intellectual activity comprehends the analysis of visual forms, especially symbolic visual forms, from a range of historical, scientific, sociological, and aesthetic points of view. Images can be analyzed within a variety of contexts and by means of a variety of methods, and their study is therefore ideally conceived of in transdisciplinary terms. And since the creation of images has an important bearing on their analysis, visual studies concerns itself with practice as well as theory.

In addition to the courses listed below, which represent only a sampling of formal curricular offerings pertinent to visual studies, interested students should be aware of the programs and facilities available in the Herbert F. Johnson Museum of Art and the ETV Center of the College of Human Ecology, as well as the frequent showings by Cornell Cinema and Pentangle II. For additional information, contact Robert Ascher (Anthropology) or Marilyn Rivchin (Theatre Arts).

Courses
Some of these courses may not be taught in 1995-96. For information about availability consult the appropriate departmental listings.

An Introduction to Architecture (Architectural 132)
Art and Visual Thinking (Textiles and Apparel 125)
Asian American Images on Film (Asian American Studies 435)
African Cinema (African Studies 435)
Art, Design, and Visual Thinking (Textiles and Apparel 125)
Blacks in Communication Media (African Studies 303)
Color, Form, Space (Art 110)
Contemporary French Culture Through Film (French 291)

Business and Preprofessional Study

UNDERGRADUATE BUSINESS STUDY

Business and Preprofessional Study

Undergraduate preparation for business is found in many schools and colleges at Cornell. Students 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 completion of business study and training; and students should consider carefully the implications of each program when making a choice. (Graduate study is available in the Johnson Graduate School of Management as well as in graduate fields following each of the undergraduate options.)

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

Applied economics and business management. This program is designed to prepare students for a career in business or in public service. Emphasis is placed on the application of economic theory and management principles. Graduates of this program typically choose careers in investment banking or finance or with firms offering opportunities in sales and marketing. Areas of specialization include business management and marketing, farm business management and finance, and food industry management.

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

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

Hotel administration. The undergraduate program in hotel administration prepares individuals to be mid- to upper-level managers and entrepreneurs for the hospitality industry (lodging, food service, and travel) and allied fields. Instruction is provided in the areas of administration and general management, human-resources management, accounting and financial management, food and beverage management, law and management, communication, science and technology, economics, and marketing.
Consumer economics and housing. Study in the department develops an understanding of the market economy from both buyers’ and sellers’ perspectives. The focus is on the economic behavior and welfare of consumers in the private, public, and mixed sectors of the economy. An understanding of economics, sociology, and government policy provides the basis for an analysis of consumers’ rights and responsibilities.

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

**Sociology.** The program provides disciplined understanding of society and social issues. The insights and analytical skills you will acquire are applicable to corporate, government, and nonprofit settings, and the department’s focus on social organization and institutions will prepare you well for graduate or professional programs in business schools. (Also see the description of the Society and Economy Concentration in the Department of Sociology section of Arts and Sciences.)

**Related Areas**

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

**Combined Degree Programs**

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

**SELECTED BUSINESS AND MANAGEMENT COURSES**

**Accounting**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Ag Ec 221</td>
<td>Financial Accounting</td>
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<tr>
<td>Ag Ec 323</td>
<td>Managerial Accounting</td>
</tr>
<tr>
<td>H Adm 120</td>
<td>Survey of Financial Management</td>
</tr>
<tr>
<td>JGSM MBA 500</td>
<td>Intermediate Accounting</td>
</tr>
<tr>
<td>JGSM MBA 501</td>
<td>Advanced Accounting</td>
</tr>
<tr>
<td>JGSM MBA 505</td>
<td>Auditing</td>
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<tr>
<td>OR&amp;IE 350</td>
<td>Cost Accounting Analysis and Control</td>
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**Communications**

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<th>Course</th>
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<tr>
<td>Comm 201</td>
<td>Oral Communication</td>
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<tr>
<td>Comm 204</td>
<td>Effective Listening</td>
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<td>Comm 272</td>
<td>Principles of Public Relations and Advertising</td>
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<td>Comm 301</td>
<td>Business and Professional Speaking</td>
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<tr>
<td>Comm 372</td>
<td>Advanced Advertising</td>
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<tr>
<td>H Adm 165</td>
<td>Managerial Communication: Writing Principles and Procedures</td>
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<tr>
<td>H Adm 304</td>
<td>Advanced Business Writing</td>
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**Computing**

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<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>Ag Ec 412</td>
<td>Introduction to Mathematical Programming</td>
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<tr>
<td>Ag Ec 413</td>
<td>Information Systems and Decision Analysis</td>
</tr>
<tr>
<td>ABEN 204</td>
<td>Introduction to Computer Uses</td>
</tr>
<tr>
<td>COMS 100</td>
<td>Introduction to Computer Programming systems: non-western countries</td>
</tr>
<tr>
<td>COMS 101</td>
<td>The Computer Age</td>
</tr>
<tr>
<td>COMS 102</td>
<td>Introduction to Microcomputer Applications</td>
</tr>
<tr>
<td>Educ 247</td>
<td>Instructional Applications of the Microcomputer</td>
</tr>
<tr>
<td>H Adm 174</td>
<td>Microcomputing</td>
</tr>
<tr>
<td>H Adm 374</td>
<td>End-User Business Computing Tools</td>
</tr>
<tr>
<td>H Adm 375</td>
<td>Hotel Computing Applications</td>
</tr>
</tbody>
</table>

**Economics**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>Ag Ec 415</td>
<td>Price Analysis</td>
</tr>
<tr>
<td>Ag Ec 431</td>
<td>Food and Agricultural Policies</td>
</tr>
<tr>
<td>Ag Ec 450</td>
<td>Resource Economics</td>
</tr>
<tr>
<td>CEE 321</td>
<td>Microeconomic Analysis</td>
</tr>
<tr>
<td>CEH 355</td>
<td>Wealth and Income</td>
</tr>
<tr>
<td>Econ 101</td>
<td>Introductory Microeconomics</td>
</tr>
<tr>
<td>Econ 102</td>
<td>Introductory Macroeconomics</td>
</tr>
<tr>
<td>Econ 314</td>
<td>Intermediate Microeconomic Theory</td>
</tr>
<tr>
<td>Econ 315</td>
<td>Intermediate Mathematical Economics I</td>
</tr>
<tr>
<td>Econ 318</td>
<td>Intermediate Mathematical Economics II</td>
</tr>
<tr>
<td>Econ 351</td>
<td>Industrial Organization</td>
</tr>
<tr>
<td>ILR/LRC 400</td>
<td>Economics of Wages and Employment</td>
</tr>
<tr>
<td>ILR/LRC 340</td>
<td>Economic Security</td>
</tr>
</tbody>
</table>

**Entrepreneurship**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>Ag Ec 325</td>
<td>Personal Enterprise and Small Business Management</td>
</tr>
<tr>
<td>Ag Ec 425</td>
<td>Small Business Counseling</td>
</tr>
<tr>
<td>Ag Ec 427</td>
<td>Advanced Personal Enterprise Systems</td>
</tr>
<tr>
<td>Ag Ec 429</td>
<td>Small Business Advisory Group</td>
</tr>
<tr>
<td>JGSM MBA 300</td>
<td>Entrepreneurship and Enterprise</td>
</tr>
</tbody>
</table>

**Finance**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>Ag Ec 324</td>
<td>Financial Management</td>
</tr>
<tr>
<td>Ag Ec 404</td>
<td>Advanced Agricultural Finance Seminar</td>
</tr>
<tr>
<td>Ag Ec 405</td>
<td>Farm Finance</td>
</tr>
<tr>
<td>Ag Ec 407</td>
<td>Financial Management in Farming</td>
</tr>
<tr>
<td>CEH 315</td>
<td>Personal Financial Management</td>
</tr>
<tr>
<td>Econ 331</td>
<td>Money and Credit</td>
</tr>
<tr>
<td>Econ 333</td>
<td>Theory and Practice of Asset Markets</td>
</tr>
<tr>
<td>Econ 336</td>
<td>Public Finance: Resource Allocation</td>
</tr>
<tr>
<td>H Adm 125</td>
<td>Finance</td>
</tr>
<tr>
<td>H Adm 322</td>
<td>Investment Management</td>
</tr>
<tr>
<td>H Adm 326</td>
<td>Corporate Finance</td>
</tr>
<tr>
<td>OR&amp;IE 451</td>
<td>Economic Analysis of Engineering Systems</td>
</tr>
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**International Business**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>Ag Ec 100</td>
<td>Introduction to Global Economic Issues</td>
</tr>
<tr>
<td>Ag Ec 430</td>
<td>International Trade Policy</td>
</tr>
<tr>
<td>Ag Ec 449</td>
<td>Global Marketing Strategy</td>
</tr>
<tr>
<td>Econ 102</td>
<td>Introductory Macroeconomics</td>
</tr>
<tr>
<td>Econ 313</td>
<td>Intermediate Macroeconomics Theory</td>
</tr>
<tr>
<td>Econ 325</td>
<td>Economic History of Latin America</td>
</tr>
<tr>
<td>Econ 366</td>
<td>The Economy of the Soviet Union</td>
</tr>
<tr>
<td>Econ 369</td>
<td>Selected Topics in Socialist Economies: China</td>
</tr>
<tr>
<td>Econ 661</td>
<td>International Trade Theory and Policy</td>
</tr>
<tr>
<td>Econ 302</td>
<td>International Monetary Theory and Policy</td>
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</tbody>
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**Law, Regulation, and Ethics**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>Ag Ec 250</td>
<td>Natural Resource and Environmental Economics</td>
</tr>
<tr>
<td>Ag Ec 320</td>
<td>Business Law I</td>
</tr>
<tr>
<td>Ag Ec 321</td>
<td>Business Law II</td>
</tr>
<tr>
<td>Ag Ec 422</td>
<td>Estate Planning</td>
</tr>
<tr>
<td>Comm 428</td>
<td>Communication Law</td>
</tr>
<tr>
<td>Econ 302</td>
<td>The Impact and Control of Technological Change</td>
</tr>
<tr>
<td>Econ 304</td>
<td>Economics and the Law</td>
</tr>
<tr>
<td>Econ 308</td>
<td>Economic Analysis of Government (also Civil and Environmental Engineering 322)</td>
</tr>
<tr>
<td>Econ 354</td>
<td>Economics of Regulation</td>
</tr>
<tr>
<td>Econ 552</td>
<td>Public Regulation of Business</td>
</tr>
<tr>
<td>Educ 477</td>
<td>Law and Educational Policy</td>
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<tr>
<td>Govt 389</td>
<td>International Law</td>
</tr>
<tr>
<td>H Adm 422</td>
<td>Taxation and Management Legislation</td>
</tr>
<tr>
<td>IRLR 201</td>
<td>Labor Relations Law and Legislation</td>
</tr>
<tr>
<td>IRLR 330</td>
<td>Comparative Industrial Relations Systems: Western Europe</td>
</tr>
<tr>
<td>IRLR 331</td>
<td>Comparative Industrial Relations Systems: Non-Western Countries</td>
</tr>
</tbody>
</table>

**Management**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>Ag Ec 220</td>
<td>Introduction to Business Management</td>
</tr>
<tr>
<td>Ag Ec 402</td>
<td>Advanced Farm Business Management</td>
</tr>
<tr>
<td>Ag Ec 424</td>
<td>Business Policy</td>
</tr>
<tr>
<td>Ag Ec 426</td>
<td>Cooperative Management and Strategies</td>
</tr>
<tr>
<td>Ag Ec 443</td>
<td>Food Industry Management</td>
</tr>
<tr>
<td>Econ 326</td>
<td>History of American Business Enterprise</td>
</tr>
<tr>
<td>H Adm 103</td>
<td>Principles of Management</td>
</tr>
</tbody>
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**Manufacturing**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>Econ 302</td>
<td>The Impact and Control of Technological Change</td>
</tr>
<tr>
<td>OR&amp;IE 410</td>
<td>Industrial Systems Analysis</td>
</tr>
<tr>
<td>OR&amp;IE 421</td>
<td>Production Planning and Control</td>
</tr>
</tbody>
</table>
PRELAW STUDY

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

1. Interest encourages scholarship, and students will derive the greatest benefit from those studies that stimulate their interest.

2. Of first importance to the lawyer is the ability to express thoughts clearly and cogently in both speech and writing. Freshman writing seminars, required of nearly all students, are designed to develop these skills. English literature and composition, and communication courses, also serve this purpose. Logic and mathematics develop exactness of thought. Also, value in economics, history, government, and sociology, because of their close relation to law and their influence on its development and ethics, and philosophy, because of the influence of philosophic reasoning on legal reasoning and jurisprudence. Psychology leads to an understanding of human nature and mental behavior. Some knowledge of the principles of accounting and of the sciences such as chemistry, physics, biology, and engineering is recommended and will prove of practical value to the lawyer in general practice in the modern world.

3. Cultural subjects, though they may have no direct bearing on law or a legal career, will expand students' interests; help cultivate a wider appreciation of literature, art, and music; and make better-educated and well-rounded persons.

4. Certain subjects are especially useful in specialized legal careers. For some, a broad scientific background—for example, in agriculture, chemistry, physics, or engineering—when coupled with training in law, may furnish qualifications necessary for specialized work with the government, for counseling certain types of businesses, or for a career as a patent lawyer. A business background may be helpful for those planning to specialize in corporate or tax practice. Students who anticipate careers involving labor law and legislation might consider undergraduate study in the School of Industrial and Labor Relations. Whatever course of study is chosen, the important goals are to acquire perspective, social awareness, and a critical cast of mind; to develop the ability to think logically and analytically, and to express thoughts clearly and forcefully. These are the crucial tools for a sound legal education and a successful career.

The presence of the Cornell Law School on campus provides the opportunity for a limited number of highly qualified undergraduates registered in the College of Arts and Sciences at the university to be admitted to the Law School. At the time of entry they must have completed 105 of the 120 credits required for the Bachelor of Arts degree, including 92 credits of course work in the College of Arts and Sciences. It may be possible for exceptionally well-qualified students in other Cornell undergraduate colleges to arrange to enter the Law School after three years. The College of Human Ecology offers a program in which students spend their fourth year at the Law School. In addition, members of the Cornell Law School faculty sometimes offer undergraduate courses such as Nature, Functions, and Limits of Law, which are open to all undergraduates.

PREMEDICAL STUDY

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

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

Exceptionally qualified students in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Human Ecology may apply for acceptance to the Medical College through a double registration procedure arranged between Cornell University and Cornell University Medical College in New York City. This procedure allows registered students to save one year in pursuit of the bachelor's and M.D. degrees. This is not a traditional "seven year program", separate application to the Medical College is required. Further information about this procedure is available from the Health Careers Program office at the Career Center, Cornell University, 2 BSE-303 Barnes Hall, Ithaca, New York, 14853-1601.

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PREVETERINARY STUDY

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

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

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

Qualified students in the College of Agriculture and Life Sciences may apply for acceptance in a double-registration program arranged between Cornell University and the College of Veterinary Medicine at Cornell. This program allows registered students to save one year in pursuit of the bachelor’s and D.V.M. degrees. Further information about this program is available from the Health Careers Program office at the Career Center, Cornell University, 103 Barnes Hall, Ithaca, New York 14853-1601.
ADMINISTRATION
Daryl B. Lund, dean
Brian F. Chabot, associate dean
Rebecca Tseng Smith, assistant dean for public affairs
H. Dean Sutphin, associate dean and director of academic programs
Elizabeth A. Oltenacu, associate director of academic programs
W. Ronnie Coffman, associate dean and director of research
Anthony M. Shelton, associate director of research
William B. Lacy, associate dean and director of cooperative extension
R. David Smith, associate director of cooperative extension
Norman T. Upshoff, director of international agriculture

Office of Academic Programs Staff
Student services: Donald Burgett, Lisa Ryan
Registrar: Mary Milks, Patricia Austic, Carol Lucas, Leora Tripodi
Admissions: Randy Stewart, Bonnie Comella, Laurie Gillespie
Career development: William Alberts, Amy Benedict-Martin
Minority programs: Catherine Thompson

Department Chairs
Agricultural and biological engineering: M. F. Walter, Riley-Robb Hall
Agricultural, resource, and managerial economics: A. Novakovic, Warren Hall
Animal science: H. F. Hintz, Morrison Hall
Communication: C. J. Glynn, Kennedy Hall
Education: D. H. Monk, Kennedy Hall
Entomology: D. A. Rutz, Comstock Hall
Floriculture and ornamental horticulture: G. L. Good, Plant Science Building
Food science: R. A. Ledford, Stocking Hall
Fruit and vegetable science: E. E. Ewing, Plant Science Building
Biotechnology Building
Natural resources: D. J. Decker, Fernow Hall
Plant breeding and biometry: E. D. Earle, Emerson Hall
Plant pathology: S. A. Slack, Plant Science Building
Rural sociology: D. L. Brown, Warren Hall
Soil, crop and atmospheric sciences: R. J. Wagener, Emerson Hall

College Focus
The College of Agriculture and Life Sciences offers educational programs that prepare young men and women with technical, management, and leadership skills. The college's programs fall into three major areas:

- Science and technology
- Management
- Communication and education

The college focuses on a broad-based education for its students, and on a problem-solving and basic research program. The program is geared to the discovery and dissemination of knowledge for the purpose of advancing the food system, agriculture, nutrition, biological sciences, environmental quality, and community and rural development throughout New York State, the nation, and the world.

There are six primary areas of focus, developed in response to the needs of society, and representing agriculture and life sciences in their broadest and most dynamic meaning:

- Agriculture (production and marketing)
- Community and Rural Development
- The Environment
- Food Systems, Nutrition, and Health
- International Dimensions
- Life Sciences

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

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

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

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

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

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

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

- Agriculture [M.P.S. (Agr.)], H. D. Sutphin, Roberts Hall
- Agricultural and Biological Engineering, M. Walter, Riley-Robb Hall
- Agricultural Economics, R. Boisvert, Warren Hall
- Animal Breeding, E. J. Pollak, Morrison Hall
- Animal Science, R. Quaas, Morrison Hall
- Biochemistry, Molecular and Cell Biology; Gerald Feigenson, Biotechnology Building
- Biometry, S. Searle, Warren Hall
- Communication, C. Glynn, Kennedy Hall
- Development Sociology, T. Lyson, Warren Hall
- Ecology and Evolutionary Biology, R. Root, Corson Hall
- Education [also M.A.T.], A. Berkey, Kennedy Hall
- Entomology, J. Liebher, Comstock Hall
- Environmental Toxicology, A. Yen, Veterinary Research Tower
- Floriculture and Ornamental Horticulture, N. Bassuk, Plant Science Building
- Food Science and Technology, J. Hotchkiss, Stocking Hall
- Genetics and Development, M. Wolfner, Biotechnology Building
- International Agriculture and Rural Development [M.P.S. (Agr.)], R. Blake, Morrison Hall
- International Development, N. Upshoff, Caldwell Hall
- Landscape Architecture [M.L.A.], L. Mirin, W. Sibley Hall
- Microbiology, V. Stewart, Wing Hall
- Natural Resources, R. Ogleby, Fernow Hall
- Neurobiology and Behavior, T. Seeley, Seeley Mudd Hall
- Nutritional Sciences, K. Rasmussen, Martha Van Rensselaer Hall
- Physiology, J. Wootton, Vet Research Tower
- Plant Biology, J. Doyle, Mann Library Building
Bachelor of Science Degree

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

Agricultural and Biological Engineering: K. Gebremedhin, 520 Wiley-Robb Hall
Agricultural, Resource, and Managerial Economics: R. Christy, 205 Warren Hall
Animal Sciences: E. J. Poliak, B-22 Morrison Hall
Biological Sciences, Division of: H. Starson, 200 Stimson Hall
Biometry and Statistics: S. Schwager, 339 Warren Hall
Communication: B. Earle, 332 Kennedy Hall
Education: D. Hedlund, 403 Kennedy Hall
Entomology: R. Roush, 6130 Comstock Hall
Food Science: J. Sherbon, 207 Stocking Hall
Landscape Architecture: P. Trowbridge, 442 Kennedy Hall
Natural Resources: T. Fabey, 8F Fenow Hall
Nutrition, Food, and Agriculture: C. Bisogni, 334 MVR Hall
Plant Science Units (Plant Biology, Breeding, Pathology/Protection, Floriculture, Pomology, Vegetable Crops): D. Viands, 523 Bradfield Hall
Rural Sociology: J. Francis, 133 Warren Hall
Soil, Crop and Atmospheric Sciences: G. Fick, 505 Bradfield Hall
Special Programs in Agriculture and Life Sciences: D. Burgett, 140 Roberts Hall

Summary of Basic College Requirements for Graduation

1. Credit Hours
   a. Minimum: 120
   b. Minimum with letter grade: 100 (number with S-U grades pro-rated for transfer students)
   c. Maximum independent study, teaching experience, internships: 15 (pro-rated for transfer students)
   d. Minimum from College of Agriculture and Life Sciences: 55
   e. Maximum from endowed colleges without additional charge: 55. Payment must be made for each credit taken in excess of the 55 allowed, whether or not the courses are passed. For the precise fee per credit, students should call the Office of the Bursar.
   f. Maximum transferred in: 60; minimum at Cornell: 60

Transfer credit will not be accepted for the Project Advance Programs. If a student is enrolled in a college/university course during his/her high school years, transfer credit will be given only if certain criteria are met:
1. Course must be a standard course taught by a post-secondary institution.
2. High school must be a satellite location, one of several options available to all students taking the course.
3. Course syllabus, text, examinations, and evaluation process must be the same for all students at all sites.
4. Students must be enrolled for college credit and pay college tuition.
5. Instructor must be a faculty member (includes adjunct) at the offering college.

If one of these is not met no transfer credit will be given. Written verification may be necessary.

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

2. Residence
   a. Normally, eight full-time semesters
   b. Seven semesters, if all other degree requirements are met, with a grade-point average of 2.0
   c. Minimum of 12 credits per semester
   d. Minimum of two semesters, including the final semester prior to graduation, in the College of Agriculture and Life Sciences (residency in the Internal Transfer Division [ITD] does not count toward residency in the college)
   e. Students who have completed 8 semesters in residence at Cornell, including two in the college, and who have 8 or fewer credits remaining for graduation may petition for approval to complete this work elsewhere.

3. Physical Education (see note at ID)
   a. Completion of university requirement for two terms of work
   b. Transfer students may be exempt from part or all of the requirement.

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

4. Grade-Point Average (GPA)
   a. Cumulative GPA: 1.7 or above must be maintained
   b. Final semester GPA: 1.7 on a minimum of 12 credits in final term before graduation.

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

5. Distribution

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

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

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

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

The college mathematics requirement is described below.

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

Biological Sciences (except 152, 160, 200 [unless permission of associate director of the division of Biological Sciences is obtained], 202, 205, 206, 208, 209, 301 or 367)
Animal Sciences 100, 221, 300, 301
Entomology 212
Nutritional Sciences 262
Plant Breeding 225
Plant Pathology 301, 309, 401

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

Social Sciences. 100- through 400-level courses in the following departments (excluding Freshman Seminars):
Anthropology
Archaeology
CEH 110/CEH 111 (cannot receive credit for these courses and Econ 101/Econ 102)
Communication 418, 422
Economics (except Agricultural Economics)
Education 271, 311, 317, 370, 378
Government (including Africana Studies 190)
HDFS 150 (cannot receive credit for this course and Soc 243)
LA/CRP 261, 360, 363
LA ARKEO 365
Psychology
Sociology (including Rural Sociology except RS 100, 175, 318, 442)
Humanities. 100- through 400-level courses in the following departments (excluding Freshman Seminars and language courses): Africana Studies (literature and history) Asian American Studies Asian and Near Eastern Studies (history and literature) Classics Comparative Literature English (literature only) French, German, Italian, Russian, and Spanish (literature only) History History of Art/History of Architecture LA 382 Music and Theatre Arts (theory, literature, and history only) Philosophy (also Natural Resources 407) Religious Studies Rural Sociology 100, 175, 318, 442 S & T 233
Group D: Written and Oral Expression
9 credits, of which at least 6 must be in written expression, selected from the following:
6. Mathematics
The faculty requires minimum competency in mathematics as a requisite to satisfactory completion of a degree. As a measure of their competency in mathematics, all entering undergraduates, including those presenting advanced placement or transfer credit in college calculus, must take the college's math proficiency test. The test is administered free of charge just prior to registration each semester. No student may repeat the proficiency test. It consists of fifty sample questions from arithmetic, algebra, geometry, trigonometry, and basic calculus.
The score on the math test has two components and will place each student in one of three groups, defined by the score of each component of the math test. Mathematics requirements for each group

Group I Students in this group are exempt from the math requirement. If further math is needed for the major area of study, they should consider taking calculus (MATH 111 or MATH 191).

Group II Students in this group MUST complete one math course at Cornell usable in Group A. The recommended math course is EDUC 115 or MATH 105. BTRY 102 is also acceptable.

Group III Students in this group are automatically registered in EDUC 105 and must also complete one math course at Cornell usable in Group A.

Transfer credit for mathematics
Most college-level math courses in a transfer student's record will be transferred (limit 6 hours into Group A of the college distribution), and the student will be held for the results of the math test and must satisfy the college's math requirement.

Students entering with A-P calculus credit will also be held for the results of the math test, and must satisfy the college's math requirement.

7. Faculty Adviser
a. Each student is assigned to a faculty adviser soon after being admitted to the college. The faculty adviser will help the student plan a program of study and enroll in courses appropriate to the degree programs offered by the college.
b. Course enrollment each semester should be planned in consultation with the faculty adviser. The signature of the faculty adviser indicates approval of, or at least consent to, the choice of courses made and is required before the course enrollment can be processed.
c. All academic plans, such as acceleration and graduate study, should be made in consultation with the student's faculty adviser. Departing from the advice of the adviser is essential if a student petitions for an exception to any of the requirements of the college.

8. Progress toward the Degree
a. The progress of each student toward meeting the degree requirements is recorded each term in the college registrar's office on a summary of record form.
b. Students who have been in residence for eight semesters and who have met the graduation requirements will be graduated. Students are entitled to attend for the full eight semesters even if they have completed the graduation requirements in fewer semesters, but must notify the College Registrar of their intent prior to the graduation date. A student who wishes to continue study after graduation must apply for admission as a special student.
c. Application to graduate. Students who are planning to graduate must complete an "Application to Graduate" by the 15th day of the first month of the semester in which they will complete their graduation requirements. This form must be signed by the student, the adviser, and the registrar, confirming that all requirements for graduation have been met.

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

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

Most students come from New York State, but around 30 percent come from other parts of the United States or abroad. About half of the undergraduates are women. Approximately 14 percent are identified as members of minority ethnic groups.

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

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

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

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

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

Part-time Students
All students in the College of Agriculture and Life Sciences are expected to be enrolled as full-time students in a registered program of study. Part-time students must register in the Division of Summer Session, Extramural Courses, and Related Programs. The Continuing Education Information Service, B-20 Day Hall, provides information, counseling, and special programs for mature students throughout the university.

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

Off-Campus Courses
Students in CALS are to be registered for at least twelve (12) hours of course work each semester. It is expected that students will not be enrolled in course work at another institution while they are enrolled at CALS.
Two exceptions to enrollment elsewhere while being a full time student at Cornell would be the joint enrollment agreements between Cornell and Ithaca College and Wells College. Other exceptions would be reviewed by the Committee on Academic Achievement and Petitions. Students must petition before enrolling for a course elsewhere. The committee would approve such petitions only when there are compelling circumstances such as severe scheduling problems or no equivalent course available at Cornell. Enrolling in a course at another college would make taking it at Cornell discouraged.

**Leave of Absence**

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

**Withdrawal**

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

**Graduation**

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

**ADVISING AND COUNSELING SERVICES**

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

The Office of Student Services has overall responsibility for coordinating the college advising and academic counseling program. Each student enrolled in the college is assigned to a faculty adviser in the major field of study for aiding in developing a program of study and peer advisers are available to help with problems of a general nature relating to personal matters and campus life.

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

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

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

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

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

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

Internships, summer jobs, job search presentations, and assistance with resume writing are other activities of interest.

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

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

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

**Academic Integrity Policy**

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

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

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

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

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

4) Faculty members fulfill their responsibility to
   - maintain in all class, laboratory, and examination activities an atmosphere conducive to academic integrity and honor
   - make clear the conditions under which examinations are to be given
   - make clear the consequences of violating any aspects of the code
   - provide opportunities for students to discuss the content of courses with each other and help each other to master that content and distinguish those activities from course assignments that are meant to test what students can do on their own without help from others
   - state explicitly the procedures for use of materials taken from published sources and the methods appropriate to a discipline by which students must cite the source of such materials
   - approve in advance, in consultation with other faculty members, which work submitted by a student and used by a faculty member to determine a grade in a course may be submitted by that student in a different course
   - monitor the work and maintain such records as will support the crucial underpinning of all guidelines: the students' submitted work must be their own and no one else's
Cornell's Code of Academic Integrity spells out how individuals who have allegedly violated Cornell standards for academic integrity are to be confronted and, if found to be in violation of those standards, sanctioned. The code provides for informal resolution of most perceived violations through a primary hearing between the faculty member and the student involved. If necessary, a hearing before a hearing board follows.

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

Individuals who observe or are aware of an alleged violation of the code should report the incident to the faculty member in charge of a course or to the chair of the hearing board.

General information and details on procedures for suspected violations or hearings are available from the Office of Student Services, 140 Roberts Hall.

ACADEMIC POLICIES AND PROCEDURES

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

The Committee on Academic Achievement and Petitions is a standing committee of six college faculty members and two students. On behalf of the faculty and subject to its review, the committee
- reviews, at the end of each semester and at other times as shall seem appropriate to the committee, the progress of all students not meeting academic requirements
- receives and acts upon petitions from individual students asking for exceptions from particular academic regulations or requirements of the college, or for reconsideration of action taken by the committee
- acts upon readmission requests from persons whose previous enrollment was terminated by the committee
- notifies the petitioner in writing of the action taken by the committee.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Specifically, the committee considers as possible cause for action failure to attend and participate in courses on a regular basis or, at the end of any semester, failure to attain one or more of the following:
- semester GPA of at least 1.7
- cumulative GPA of at least 1.7
- satisfactory completion of 12 or more credits per semester
- reasonable progress toward completion of distribution requirements
- appropriate completion of college and university requirements

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

HONORS PROGRAM

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

An undergraduate wishing to enroll in the honors program must have completed at least 55 credits, at least 50 of the 55 at Cornell. Also, the student must have attained a cumulative grade-point average of at least 3.0 at the time of entry.

Interested students must make written application no later than the end of the third week of the first semester of their senior year, but are encouraged to make arrangements with a faculty member during the second semester of their junior year. An application form is available from the college registrar, 140 Roberts Hall, or from 200 Stimson Hall. Written approval of the faculty member who will direct the research and of the honors committee in the area is required. After the college registrar verifies the student's grade-point average, the student will be officially enrolled in the honors program.

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

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

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

**Animal Sciences**

Faculty committee: W. B. Currie, chair; D. E. Bauman, P. A. Johnson, E. Mattashvili

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

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

- Identify a potential honors project sponsor (i.e., a faculty member working in the animal sciences) and secure that faculty member's commitment to sponsor the student in the honors project. That should be accomplished early in the second semester of the junior year.
- Preregister during the spring semester for AS 496, Animal Sciences Honors Seminar, which is offered in the fall semester.
- Register for AS 499, Undergraduate Research.
- Participate in AS 402, Seminar in Animal Sciences, during the spring semester and report on and discuss the project and results.
- Submit a written thesis to the honors committee by the scheduled deadline. Specific information regarding deadlines, format, and organization for the thesis will be provided.
- Meet with the honors committee for a short oral defense of the thesis following a review of the thesis by the student's sponsor and the honors committee.

Details pertaining to the specific requirements of the program can be obtained from the office of the committee chair, 434 Morrison Hall.

**Biological Sciences**

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

**Entomology**

Faculty committee: B. L. Peckarsky, chair
An honors program in the area of entomology may be pursued by any qualified student in the College of Agriculture and Life Sciences (see the requirements at the beginning of this section). The student need not be specializing in entomology. Insects, because of their small size, easy availability, and convenient subjects for study in a wide array of problems dealing with living systems, Short life cycles, unique physiologies and developmental patterns, and species with easily managed colony requirements and a wide range of behavioral traits provide the raw material for honors study.

Cornell's diverse faculty interests and extensive collections and library in entomology are also major assets if a student selects entomology as the area for honors study.

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

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

**Natural Resources**

Faculty committee: M. E. Richmond, chair; R. J. McNeil, D. D. Decker, B. Kruth, T. Fahey, C. Krueger

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

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

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

**Nutritional Sciences**

Faculty committee: M. N. Kazaninoff

The honors program offers students a research experience structured to give them the opportunity to choose a research project, search the literature relevant to it, plan and execute the research, and write it up in the form of a thesis. As in other types of research available to undergraduates, each student is guided by a faculty mentor. The honors project is designed to be spread over both semesters of the junior and senior years.

Students who consider this option should be aware that it involves a number of deadlines and considerable time commitment. Before signing on for honors they need to consult with their academic advisers to make sure that honors will not interfere with other academic objectives, such as preparation for admission to medical school or making the dean’s list. Although honors research credits for spring semester junior year and both semesters senior year are designed LET, individual mentors may choose the R grade for work in progress until the project has been fully completed. An outline of activities for both years is given below.

**Junior Year**

**Fall Semester** Course No: NS 398 (1 credit, S-U): Students are oriented to the program, and provided material that summarizes the range of research activities in DNS. Faculty will make presentations on honors research opportunities available. Students begin making arrangements with faculty members. When these arrangements have been completed, students will begin a literature search that focuses on their research problems. After fall break, the group will meet alternate weeks to present and discuss literature reviews with each other and the honors chair.

**Spring Semester** Students register for NS 498 (1 credit, section 1). Additional faculty presentations of research opportunities are made and orientation to supportive services available through DNS are made. Placements with faculty mentors should be completed by spring break. Each student may also register under the number NS 499 for a convenient number of credits, to be determined in consultation with the chosen adviser. Work carried out will have two objectives:
1. to become familiar with literature and/or research methods appropriate to the problem for the honors research.
2. to develop a research proposal.

The semester outcome will be written reports/discussions of the method(s) or literature searches and a short research proposal, evaluated by the research adviser.

**Senior Year**

**Fall Semester** Students will register under the number NS 499 (2-4 credits, LET), by arrangement with their mentors). They may begin their research earlier than fall, e.g., during the summer, or even earlier, but should be prepared to begin research **early in the fall semester at the latest**. The objective for the semester will be to conclude most of the hands-on research/data acquisition.

**Spring Semester** Students will again register under course number NS 499 for 2-4 credits LET, by arrangement with their research mentors. Much of the allotted time will be spent on data analysis and on writing the honors thesis.

Several important deadlines should be noted.
1. **Last week in March**: The names of thesis readers** are to be in the hands of the honors committee.
2. **Third to fourth week of April**: A final draft of the thesis is handed to the readers.
3. **First to second week of May**: Scheduled seminars for oral presentations of each students research.
4. **Last day of oral presentations**: Final form of the thesis is handed to the honors chairman.

To help students meet these deadlines, students register for NS 498 (1 credit, section 2) class sessions will be held before spring break for guidance in thesis writing and/or informal reporting of preliminary data. After spring break the group will meet once or twice (depending on number of students) to practice oral presentations of completed research.

* Grade is determined by each student’s mentor.

**Two readers knowledgeable in the area of the student’s research topic to be chosen by the honors committee and faculty advisers.

**Physical Sciences**

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

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

Students must be enrolled in the program for a minimum of two semesters and must also enroll in the appropriate departmental independent study course for a total of at least 6 credits. They must submit a report of their research, usually in the form of a journal article, to the honors committee by the end of the second semester of the junior year. The purpose of the proposal is to familiarize the student with the problems of scientific research and make possible an independent investigation of the chosen subject. In the summer, the student will make a presentation to the honors committee on the progress of his research. A manuscript of the student’s research will be submitted to the honors committee before the second day of the examination period. When the committee accepts the honors report, the student’s name will be added to the list of students who have completed the requirements and submit to the Plant Sciences Honors Committee a project proposal (2-3 pages) which includes a title, a brief background to the problem (classification and literature review); a clear statement of objective(s) and hypotheses to be tested; methodology and experimental plan, necessary space, equipment and supplies; and a project budget. The proposal must be accompanied by a letter from the faculty supervisor stating that he or she has approved the project plan and that its completion within the remainder of the student’s undergraduate tenure is feasible.

Successful completion of the honors program requires acceptance by the honors committee of two copies of a research report. The report should be written in the format of a research publication in the appropriate scientific field. The acceptable report must have been reviewed and corrected according to recommendations of the research supervisor before the report is submitted to the honors committee. The report must be received by the honors committee at least two weeks before the last day of classes of the semester in which the degree is sought and must be accompanied by a letter from the research supervisor evaluating the research and, if appropriate, recommending graduation with honors.

The honors committee will review the report within one week and may accept it or return it to the student with specific recommendations for revisions. A suitably revised version must be submitted to the committee before the second day of the examination period. When the committee accepts an honors report, the chair will recommend to the Director of Academic Programs and to the College Registrar that the student be graduated with honors. One copy of the accepted report will be returned to the student with review comments from the committee. The other copy will be shelved in Mann Library.

**Social Sciences**

Faculty committee: B. V. Leuenstein, chair; E. J. Haller, M. J. Pfeffer, L. S. Willett

Acceptance into the behavioral and social sciences honors program of the College of Agriculture and Life Sciences is contingent upon meeting all the criteria described above, on information in the student’s written application, and on a detailed thesis proposal. The application and proposal are due no later than the third week of the first semester of the senior year. Each student is encouraged to begin working on this proposal with a prospective faculty thesis adviser during the first semester of the junior year. The purpose of the proposal is to familiarize the student with the problems of scientific research and make possible an independent investigation of the chosen subject. In the summer, the student will make a presentation to the honors committee on the progress of his research. A manuscript of the student’s research will be submitted to the honors committee before the second day of the examination period. When the committee accepts the honors report, the student’s name will be added to the list of students who have completed the requirements and submit to the Plant Sciences Honors Committee a project proposal (2-3 pages) which includes a title, a brief background to the problem (classification and literature review); a clear statement of objective(s) and hypotheses to be tested; methodology and experimental plan, necessary space, equipment and supplies; and a project budget. The proposal must be accompanied by a letter from the faculty supervisor stating that he or she has approved the project plan and that its completion within the remainder of the student’s undergraduate tenure is feasible.

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- **Research Topic**: This section should contain a statement of the problem to be studied or the topic of interest. The relevant literature should be briefly reviewed and the background of the problem or topic discussed; a more
undergraduate tuition rate, will be applied for undergraduate statutory college students taking excess credit hours from endowed colleges and universities should be directed to the university bursar.

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

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

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

The Department of Science and Technology Studies is an academic unit that engages in teaching and research involving the interactions of science and technology with social and political institutions. The program, which is drawn from the various divisions of the university, including the College of Agriculture and Life Sciences. It offers an interdisciplinary undergraduate major in Biology and Society. A concentration in general studies in agriculture may be planned in consultation with a faculty adviser to include a biology and society component. Further information, including a list of courses, may be obtained from the undergraduate office, 275 Clark Hall.

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

The Comparative and Environmental Toxicology Program is a multidisciplinary intercollege program with research, teaching, and cooperative extension components coordinated by the Institute for Comparative and Environmental Toxicology (ICET). Courses are offered by academic departments in several colleges of the university. A description of the program and general information is available from the

director of the program through the ICET office, 16 Fernow Hall.

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

**OFF-CAMPUS STUDY PROGRAMS**

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

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

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

**Albany Programs**

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

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

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

All interns will audit the orientation sessions and meet participation requirements in at least two of the lecture-seminar sections. The paper required in each section constitutes an independent study project to be directed and evaluated by a Cornell faculty member in an appropriate discipline. Normally a faculty

**INTERCOLLEGE PROGRAMS**

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

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

Students who have been offered admission to the S. C. Johnson Graduate School of Management upon completion of the B.S. degree in Agriculture and Life Sciences may take a program of management courses in their senior year if it is approved by their college faculty adviser as part of their undergraduate program. In certain cases an "upset" tuition charge, equal to the endowed
member will not sponsor more than one of the independent study courses for any one student. To receive academic credit for the internship, students enroll in ALS 400, for an S/U grade only.

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

Cornell-in-Washington

The Cornell-in-Washington Program offers students from all colleges within the university an opportunity to earn full academic credit for a semester in Washington, D.C. Students take courses from Cornell faculty, conduct individual research projects, and work as externs. The Cornell-in-Washington Program offers two study options: 1) studies in public policy, and 2) studies in the American experience. Students take part in a public policy or humanities seminar which requires them to serve as externs in federal agencies, congressional offices, or nongovernmental organizations on a unique set of individual research projects under the supervision of Cornell faculty. The required externships and all course enrollments are arranged through, and approved by, the Cornell-in-Washington program. Students in the College of Agriculture and Life Sciences must register for ALS 500 and cannot receive credit for the externship experience alone. For further information, see p. 19 or inquire at 131 Sage Hall, 255-4090.

SEA Semester

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

Shoals Marine Laboratory

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

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

Internships

Several departments in the college offer supervised internships for academic credit. Arrangements should be made with the offering department for assignment of a faculty member who will be responsible for placement, for planning the program of work, and for evaluation of student performance. For internships not governed by an established internship course, the student must enroll in a 497 course for the number of credits to be assigned. If the work is done during the summer, the student must enroll in the Cornell summer session for the agreed-upon credits.

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

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

The College of Agriculture and Life Sciences does not offer a field study option. In general, a rather narrow view is taken toward awarding academic credit for work experience, "life" experience, or apprenticeships. Credit will only be assigned or accepted in cases where a professor is directly involved in determining both the course content and in evaluating a student's work. The awarding of credit will not be allowed in cases where a student brings to the college or to a professor a description of a past experience and requests credit in cases where the student has received financial remuneration.

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

Overseas Academic Programs

The Cornell Abroad program is open to students in all colleges of the university. Students in the College of Agriculture and Life Sciences should consult with their faculty adviser and the college registrar to ensure that credit received for academic work abroad will meet requirements for graduation. The Office of Student Services, 140 Roberts Hall, has information and application forms.

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

INTERDISCIPLINARY PROGRAM

Science of Earth Systems

A new program in the Science of Earth Systems (SES) is now available for students in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Engineering. The SES program emphasizes a rigorous, objective study of the Earth system as one of the outstanding intellectual challenges in modern science and as the necessary foundation for the future management of our home planet. The program, described in more detail in the introductory section, was conceived under "Interdisciplinary Centers, Programs, and Studies," coalesces Cornell's teaching and research strengths across a broad range of earth and environmental sciences to provide students with a rigorous scientific foundation for the study of our complex, highly interactive earth. The program is being proposed as an inter-college major which should be available to students during the Spring of 1996, and we expect to have graduates in the Spring 1997 semester.

The curriculum includes a freshman/ sophomore emphasis on strong preparation in mathematics, physics, chemistry, and biology. In the junior and senior years, students take a set of common SES core courses and an additional set of advanced disciplinary or interdisciplinary courses that build on the basic sequences. Students wishing to explore the new field are encouraged to enroll in the SES Colloquium (SES 101/103, ABEN 120/121, GEOL 123/124, SCAS 101/102) and one or both of the upper-level core courses offered during the 1995/1996 academic year. These courses are Climate Dynamics (SES 301, SCAS 331, ASTRO 331) and Evolution of the Earth System (SES 302, GEO1 302, SCAS 332).

A broad range of interdisciplinary tracks is available through course offerings and a selection of the three colleges. This tracking is accomplished through the selection of courses beyond the core sequence. These courses should build on the core sequence and generally include junior and senior level courses with prerequisites in the basic sciences and mathematics. Effective tracks can be designed to prepare students for careers or graduate study in specific environmental science disciplines including atmospheric sciences, hydrology, biogeochemistry, ecology, oceanography, and geophysics. Meaningful and effective combinations of these disciplines are also possible. The selection of the course sequences must be approved by the SES Coordinating Committee to ensure that depth as well as breadth is attained.

For more information about the SES program, contact K. H. Cook in SCAS (255-5123), J. Parlanghe in ABEN (255-2476), or R. Howarth in BioSci (255-6175).
MAJOR FIELDS OF STUDY

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

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

Agricultural and Biological Engineering

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

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

The undergraduate program area offered by the Department of Agricultural and Biological Engineering includes three distinct academic programs: Agricultural and Biological Engineering, Environmental Systems Technology, and Agricultural Systems Technology.

The department is located in Riley-Robb Hall and operates specialized facilities that are among the largest and most complete of their kind in the world.

The Agricultural and Biological Engineering program has three concentrations:

1. Agricultural Engineering
2. Biological Engineering
3. Environmental Systems Engineering

Further details on the Agricultural and Biological Engineering and Technology programs, see the department's undergraduate programs publication, available at 207 Riley-Robb Hall, or telephone the Coordinator of Instruction for the programs, at 255-2499.

The Science of Earth Systems Program

A new program in the Science of Earth Systems will be available to students in the Colleges of Agricultural and Life Sciences, Engineering, and Arts and Sciences beginning fall 1995. This new intercollege program emphasizes a strong foundation in basic, math and science and an integrated approach to the study of the earth system including the lithosphere, biosphere, hydrosphere, and atmosphere. The aim is to prepare students for graduate study and careers across the broad spectrum of earth sciences required for successful understanding and management of our planet. A description of the program and proposed requirements are given for engineering students in the College of Engineering section of the catalog and for all other students in the introductory section of the catalog under "Interdisciplinary Centers, Programs, and Studies." Students interested in the program can contact any of the following faculty members: E. H. Tjoelker, T. S. Steenhuis, J.-Y. Parlange or W. H. Brutsaert.

Animal Sciences

The animal sciences program area offers a coordinated group of courses dealing with the principles of animal breeding, nutrition, physiology, management, and growth biology. Emphasis in subject matter is directed toward domestic animal species, dairy and beef cattle, horses, poultry, pigs, and sheep, while laboratory, companion, and zoo animals are also included in research and teaching programs. The Animal Science department has extensive facilities for animal production and well-equipped laboratories and classrooms, including a teaching barn, in which students can gain practical experience in the care and management of large animals at a campus location.

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

It is recommended that students obtain appropriate fieldwork or animal experience during summers. Several special training
opportunities exist for highly motivated students. Underclass students whose academic records warrant it may, by arrangement with individual faculty members, engage in research (either for credit or for Honors) or assist with teaching (for credit). The Dairy Management Fellows program and the Livestock Fellows program offer an equally challenging but different type of experience for a highly select group of students.

**Applied Economics and Business Management**

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

- **Agribusiness management** is designed for students who have a special interest in the economics and management of businesses that provide services for the agricultural sector of the economy.
- **Agricultural and applied economics** provides a general program in the economics of the agricultural sector and of resource use. It is an appropriate major for those students who (1) are interested in applied economics; (2) want to survey offerings in agricultural, resource, and managerial economics, such as management, marketing, economic development, policy, and environmental and resource economics; and (3) want to prepare for graduate work in agricultural economics. It is an appropriate option for those interested in the application of the principles of economics to problems in both the public and private sector.
- **Business management and marketing** applies the principles of economics and the tools of management to prepare students for careers in business. Special emphasis is given to developing decision-making skills and to the study of the structure and practices of business institutions. Market analysis, sales, banking, merchandising, production management, and general business management are careers for which students may prepare.
- **Environmental and resource economics** provides training for students interested in applying economic concepts to problems of the environment and resource use. A good option for those wishing to take positions as analysts with agencies that have environmental responsibility or facing environmental regulations.
- **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 such posts as Agricultural Lenders, Extensions Specialists, or Consultants.
- **Food-industry management** is designed for students interested in management or sales positions with the processing, manufacturing, or distribution segments of the food industry. All of these areas of specialization can provide a strong foundation for graduate work. In planning a course schedule, students must work closely with their faculty adviser. Each area of specialization has its own unique set of required and recommended courses, yet all the areas have in common the ability to satisfy the interests and abilities of each individual student.

**Biological Sciences**

Biology is a popular subject at many universities for a variety of reasons: It is a science that is in an active phase of development; it prepares students for careers in challenging and appealing fields such as human and veterinary medicine, environmental sciences, and biotechnology; and it deals with the inherently interesting questions that arise when we try to understand ourselves and the living world around us. Many of the decisions we face today deal with the opportunities and problems that biology has put before us.

The major in biological sciences at Cornell is offered by the Biological Sciences program of study to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Student services in the division's Office for Academic Affairs and the Belheim Biology Center are available to students from either college.

The biology major is designed to enable students to acquire the foundations in physical and life sciences necessary to understand modern biology and to pursue advanced studies in a specific area of biology. Programs of study include animal physiology, biochemistry, cell biology, ecology and evolutionary biology, general biology, genetics and development, microbiology, neurobiology and behavior, and plant biology. A special program of study is available for qualified students with an interest in nutrition. Students interested in the marine sciences may consult the Cornell Marine Programs Office (G14 Stimson Hall, 255-3717) for academic advice and career counseling. For more detail about the biology curriculum see the section in this catalog on the Division of Biological Sciences.

**Biometry and Statistics**

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

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, government, and businesses ranging from large corporations to small consulting firms; salaries are usually excellent. While satisfying course requirements for a major in biometry and statistics, students can also take a wide variety of courses in other disciplines. In fact, students are encouraged to take courses in applied disciplines such as agriculture, biology, economics, and the social sciences that involve numerical data and their interpretation. Students majoring in this area are required to take at least two computer science courses (e.g., Computer Science 100 and 211), mathematics courses (at least three semesters of calculus), and Biometry and Statistics 102, 200, 215, 406–409, 417, 601–602, and 607, and Industrial and Labor Relations 310. Experience gained through summer employment or work as an undergraduate teaching assistant is highly recommended. Students should contact Steven J. Schwager for information.

**Communication**

Everyone relates to others through the process of communication. Whether these human linkages are personal or through the mass media, there is an increasing need for individuals who can help establish communication patterns that are more efficient and effective. Individuals who are able to do this must be competent communicators themselves and must comprehend the processes of human communication. Students in the Department of Communication have the opportunity to learn both the social science underlying communication and the most effective means of adapting written, spoken, and visual messages to individual receivers and groups. With this preparation, students will be better able to meet the needs of communicating in the twenty-first century.

Required courses for the major include: theory of communication, understanding mass communication, public speaking, visual communication, communication analysis, research methods in communication, and two professional writing courses. Beyond these requirements, majors choose five elective courses (15 credit hours) within the Department of Communication. Specific choices of courses are determined by a student's interests and guided by faculty advice.

In addition to the required communication courses, majors take a concentration of four courses (at least 12 credits) outside the department. The concentration helps orient students to a communication career in a business, government, animal science, or public service organization or may be used to explore another area of intellectual inquiry in conjunction with communication.

Courses for the major and the concentration may be combined for a wide variety of professions. Students can prepare for careers in health, environment, or science by combining a major or concentration in communication presenting scientific and technical information to the general public or communicating with scientific and technical constituents. Careers also are possible as communication and public information specialists in almost any type of organizations, and for careers in information agencies in which they must work with a broad range of publics and media. Students can study for work as publications editors or writers in virtually any organization, perhaps preparing annual reports, editing an employee newspaper, writing sales or marketing literature, or writing news stories. Other careers are open to communication majors in human service professions, such as personnel administration and training, and management consulting.

The major also can prepare students for graduate study in communication, other social sciences, and professions such as law.

Communication majors are strongly encouraged to seek practical communication experience through part-time or summer employment, the department's internship course, and the campus media. Work
excellent preparation for graduate work or for many post-baccalaureate positions. Educational psychologists develop and/or supervise training programs in business, industry, the military, and government; design and evaluate curriculum and instructional materials for publishers; develop tests for educational and professional associations; evaluate social programs; work in human resource management; and conduct research for educational research organizations.

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

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

**General education.** The concentration in General Education provides a solid background in the foundations of education and the opportunity to explore more specialized areas. Students can prepare themselves for graduate programs in areas such as: environmental education; research methods; extension, adult, and continuing education; and the social/economic/legal/philosophical foundations of education. This concentration is appropriate for a variety of careers in nonformal educational settings, human resources, and youth work. Further information is available from the undergraduate coordinator, Kennedy Hall.

**Teacher Certification**

**Teacher education in agriculture.** Students completing the Cornell registered program earn grade 7-12 certification to teach agricultural subjects (animal science, plant science, mechanical science, environmental science, and business management), introduction to occupations, occupational science, and educational mathematics; and the introduction to technology course required for all 7th-8th grade students.

A passing grade on the National Teacher Examination (NTE) or Liberal Arts and Science test (LAST); and one year of agricultural work experience are required. Certification is valid for five years. A master's degree is required for permanent certification offered through graduate study at Cornell.

Students may also be certified to teach selected science subjects (e.g., biology, earth science, and general science) and work as a diversified cooperative education work experience coordinator through direct application to the State Education Department. For more information contact the program coordinator at (607) 255-2198.

**Teacher Education in science and mathematics.** Students at Cornell may pursue teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. Teacher Education in Science and Mathematics (TESM) is a university program jointly conducted by the departments of Education and Mathematics. TESM students who begin the program as juniors or seniors complete their undergraduate mathematics and five education courses. TESM students come from a number of different majors offered at Cornell, including Animal Science, Biometry and Statistics, and Engineering.

In a fifth year of study, TESM students do student teaching and take additional science and/or mathematics courses. Students earn the Master of Arts in teaching degree for this graduate study. Students who complete the TESM program and pass the required New York State tests are eligible for provisional certification in New York State. The masters degree is required for permanent certification in New York State. Students can also begin the TESM program at the graduate level.

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

**Entomology**

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

**Specific Requirements**

**Basic Sciences**

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

**General Biology**

- Introductory Biology
- Biological Sciences 281, Genetics, or Plant Breeding 225, Plant Genetics

A choice of one:
- Biological Sciences 261, Principles of Ecology
- Biological Sciences 330 or 331, Principles of Biochemistry
- Biological Sciences 378, Evolutionary Biology

**Entomology**

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

It is strongly recommended that students who wish to undertake graduate training in entomology include course work beyond the minimum in their program, including enrollment in more than one of the general biology courses, i.e., ecology, biochemistry, and evolutionary biology. Students interested in pest management may include courses such as Entomology 241, Applied Entomology, Entomology/Plant Pathology 444, Integrated Pest Management, or other appropriate specialized courses.
Food Science
The mission of the Food Science Program is to educate students for careers in food science and technology. Graduates are prepared for entry level positions in industry, government, and research organizations or for advanced study in food science and related disciplines. Food scientists qualify for satisfying careers which focus on ensuring the sustainable availability of safe, nutritious, affordable, and high quality food supply for people throughout New York State, the nation, and the world.

Students chose one of five specialization options: 1) Basic Food Science, 2) Food Engineering, 3) Food Processing, 4) Food Industry Operations and Management, 5) International Food Development. The first three options meet minimum curriculum standards set by the Institute of Food Technologists, the premier professional society for food scientists. Students choose an option based on individual interests and career goals. The choice should be made as early as possible.

The first two years of the program are focused on establishing a solid background in the physical and biological sciences, math, and communication skills. Required courses include biology, microbiology, calculus, physics, freshman seminar, food science, and nutrition. The second two years emphasize the application of basic science and technology to the processes of the ambient environment. The program also offers a two-year Bachelor of Science degree administered through the College of Agriculture and Life Sciences; a three-year Master of Landscape Architecture degree administered through the Graduate School for those who have a four-year undergraduate degree in another field. Both of these degrees are accredited by the Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects.

The program also offers a two-year Master of Landscape Architecture Advanced Degree Program administered through the Graduate School, for those with accredited degrees in Landscape Architecture or Architecture. The two-year program entails developing concentrations in subject matter areas such as landscape history and theory, landscape ecology and urban horticulture, the cultural landscape, site/landscape + art, or urban design.

In addition, an undergraduate concentration in the American Cultural Landscape is available for nonmajors.

Dual Degree Options
Graduate students can earn a Master of Landscape Architecture and a Master of Science (Horticulture) or a Master of City and Regional Planning simultaneously. Students need to be accepted into both fields of study and graduate within a five-year period. Students are strongly encouraged to participate in research supervised by a faculty member and/or to work as an intern in a food company during summers. Most faculty in the department have active research programs and welcome participation by undergraduate students. Students may receive academic credit or wages for undergraduate research on campus. Many food companies recruit on campus for their summer internship programs. These internships are excellent opportunities for students to gain experience and establish contacts for future employment.

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

Landscape Architecture Program
The Landscape Architecture Program focuses on the art of landscape design as an expression of cultural values combined with natural processes of the environment. The program's unique place within the university promotes interaction among the areas of horticulture, architecture, and city and regional planning. The program is co-sponsored by the colleges of Agriculture and Life Sciences and Architecture, Art, and Planning.

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

The Landscape Architecture Program offers two professional degree alternatives: a four-year Bachelor of Science degree administered through the College of Agriculture and Life Sciences; a three-year Master of Landscape Architecture degree administered through the Graduate School for those who have a four-year undergraduate degree in another field. Both of these degrees are accredited by the Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects.

The program also offers a two-year Master of Landscape Architecture Advanced Degree Program administered through the Graduate School, for those with accredited degrees in Landscape Architecture or Architecture. The two-year program entails developing concentrations in subject matter areas such as landscape history and theory, landscape ecology and urban horticulture, the cultural landscape, site/landscape + art, or urban design.

In addition, an undergraduate concentration in the American Cultural Landscape is available for nonmajors.

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

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

Bachelor of Science Landscape Architecture Degree Sequence:

### First Year

<table>
<thead>
<tr>
<th>Fall Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LA 141, Freehand Drawing</td>
<td>3</td>
</tr>
<tr>
<td>Biological sciences elective</td>
<td>3</td>
</tr>
<tr>
<td>Physical sciences elective</td>
<td>3</td>
</tr>
<tr>
<td>Social sciences or humanities elective</td>
<td>3</td>
</tr>
<tr>
<td>Written or oral expression elective</td>
<td>3</td>
</tr>
</tbody>
</table>

### Spring Term

| *LA 142, Introduction to Landscape Architecture | 4 |
| Biological sciences elective | 3 |

### Second Year

<table>
<thead>
<tr>
<th>Fall Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*LA 480, Principles of Spatial Design</td>
<td>3</td>
</tr>
<tr>
<td>*LA 201, Design, Theory, and Composition</td>
<td>6</td>
</tr>
<tr>
<td>Free elective</td>
<td>3</td>
</tr>
<tr>
<td>HORT 355, Woody Plant Materials for Landscape Use</td>
<td>3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*LA 202, Design, Composition and Theory</td>
<td>6</td>
</tr>
<tr>
<td>LANAR 524, History of European Landscape Architecture</td>
<td>3</td>
</tr>
<tr>
<td>Written or oral expression elective</td>
<td>3</td>
</tr>
<tr>
<td>Physical sciences elective</td>
<td>3</td>
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</table>

### Third Year

<table>
<thead>
<tr>
<th>Fall Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*LA 301, Site Design and Detailing</td>
<td>6</td>
</tr>
<tr>
<td>*LA 310, Site Engineering</td>
<td>4</td>
</tr>
<tr>
<td>*LANAR 525, History of American Landscape Architecture</td>
<td>3</td>
</tr>
<tr>
<td>*LA 491, Design and Plant Establishment</td>
<td>3</td>
</tr>
</tbody>
</table>

### Spring Term

| *LA 302, Site Design and Detailing | 6 |
| Biological sciences elective | 3 |
| Physical sciences elective | 3 |
| *LA 312, Site Construction | 4 |

### Fourth Year

<table>
<thead>
<tr>
<th>Fall Term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>*LA 401, Advanced Project Studio</td>
<td>6</td>
</tr>
<tr>
<td>*LANAR 520, Contemporary Issues in Landscape Architecture</td>
<td>2</td>
</tr>
<tr>
<td>Social sciences or humanities elective</td>
<td>3</td>
</tr>
<tr>
<td>Free elective</td>
<td>3</td>
</tr>
</tbody>
</table>

### Summary of credit requirements

- Specialization requirements: 67
- Distribution electives: 42
- Free electives: 11

### Major Fields of Study

- Biological sciences elective: 3
- Written or oral expression elective: 3
- Free elective: 3

### Credits

- Total: 120
Master of Landscape Architecture (M.L.A.)
License Qualifying Degree

Requirements of the three-year M.L.A. curriculum include 90 credits, and 6 resident units satisfactory completion of the core curriculum courses, and a thesis.

### First Year

**Fall Term**
- LA 505, Graphic Communication I (3 cr)
- LA 480, Principles of Spatial Design and Aesthetics (3 cr)
- LA 501, Theory, Composition and Design (6 cr)
- HORT 335, Woody Plant Materials for Landscape Use (3 cr)
- LANAR 520, Contemporary Issues in Landscape Architecture (2 cr)
- **Total Credits:** 17 cr.

**Spring Term**
- LA 502, Design, Composition and Theory (6 cr)
- LANAR 524, History of European Landscape Architecture (3 cr)
- LA 506, Graphic Communications II (3 cr)
- **Free elective(s)** (4 cr)
- **Total Credits:** 16 cr.

### Second Year

**Fall Term**
- LA 601, Project Design and Application (6 cr)
- LA 610, Site Engineering (4 cr)
- LANAR 525, History of American Landscape Architecture (3 cr)
- LA 491, Design and Plant Establishment (3 cr)
- **Total Credits:** 16 cr.

**Spring Term**
- LA 602, Natural Systems and Planting Design Studio (6 cr)
- LA 590, Graduate Seminar (2 cr)
- LA 612, Site Construction (4 cr)
- **Free elective(s)** (5 cr)
- **Total Credits:** 17 cr.

### Third Year

**Fall Term**
- LA 701, Urban Design and Planning Studio (6 cr)
- **Free elective** (6 cr)
- **Total Credits:** 12 cr.

**Spring Term**
- LA 800, Master's Thesis in Landscape Architecture (9 cr)
- LA 412, Professional Practice (1 cr)
- **Free elective(s)** (2 cr)
- **Total Credits:** 12 cr.

**Summary of credit requirements**
- Specialization requirements (73 cr)
- **Free electives** (90 cr)

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**Master of Landscape Architecture Advanced Degree Program**

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

The objective of the two-year (M.L.A./A.D.) program is to develop specializations for individuals who may wish to teach, practice, or conduct applied research in landscape architecture. Students are permitted some flexibility in establishing programs that take full advantage of the teaching and research resources of the university.

Students admitted to the two-year M.L.A./A.D. program are required to complete 60 credits of course work as approved by the members of their graduate committee. This must include at least two advanced studio courses, a graduate seminar, a concentration, and a thesis.

**Undergraduate Concentration for Non-Majors**

Students outside the professional program may choose the undergraduate concentration in the American Cultural Landscape to complement their major. The courses center on the landscape as an object, something to be studied for its own sake, and as a subject, as a means to understand society and its relationship to natural systems and diverse cultures. The cultural landscape includes its visible elements as well as perceptions and cultural ideas and values. The concentration consists of five courses, two required and three elective. Students may petition to substitute one course in the electives list. Direct inquiries to professors H. Gottfried or S. Baugher.

**Visual Studies (choose one):**
- Arch 11 Introduction to Architectural Design (4 cr)
- Art 121 Introduction to Painting (3 cr)
- Art 141 Introduction to Sculpture (3 cr)
- Art 151 Introduction to Drawing (3 cr)
- Art 158 Conceptual Drawing (3 cr)
- Art 159 Life and Still-Life (3 cr)
- Art 161 Photography I (3 cr)
- DEA 101 Design I: Fundamentals (3 cr)
- DEA 114 Drawing (3 cr)
- LA 141 Freehand Drawing (3 cr)

**The Landscape**
- LA 282 The American Landscape (3 cr)

**Electives (choose three):**
- LA 261 Urban Archeology (3 cr)
- LA 360 Pre-Industrial Cities and Towns of North America (3 cr) offered alternate years [1995-96, 1997-98]
- LA 363 American Indians, Planners, and Public Policy (3 cr)
- **LANAR 521 History of American Landscape Architecture (3 cr)**

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**Natural Resources**

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

**Required Core Curriculum**

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

**Group A - Physical Sciences**
- Mathematics - 2 courses (6-8 cr.)
- Chemistry - 2 courses (7-8 cr.)

**Group B - Biological Sciences**
- Introductory biology - 8 cr. hours (8 cr.)
- General ecology - 1 course (4 cr.)

**Group C - Social Sciences**
- 3 credits in addition to
- 3 credits in economics (6 cr.)

**Humanities**
- 6 credits in addition to a course in "normative" ethics (NTRES 407, or PHIL 241, 246, or 247) (9 cr.)

**Group D - Written and Oral Expression**
- Freshman Writing Seminars - 2 courses (6 cr.)
- Oral communications - 1 course (3 cr.)

**Courses outside the Distribution Groups**
- Statistics - 1 course (3 cr.)
- Computer applications or programming - 1 course (3 cr.)
- The Core Curriculum's second portion is composed entirely of courses offered by the Department of Natural Resources; a minimum of 19 hours in department courses is required.

**YEAR 1**

**Total Hours**
- One of 2 introductory courses: (3 cr.)
- NTRES 100 Principles of Conservation (Fall, 3 cr.)
- NTRES 201 Environmental Conservation (Spr., 3 cr.)

**YEAR 2**
- both courses listed:
- NTRES 210 Introductory Field Biology (Fall, 4 cr.)
- NTRES 253 Applied Ecology and Ecosystem Management (Spr., 3 cr.)
Students should seek relevant work experience to complement their academic studies.

**Nutrition, Food, and Agriculture**

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

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

Nutrition, food, and agriculture majors complete a core set of requirements and choose elective courses in the areas of their particular interest. The core curriculum includes introductory chemistry and biology, organic chemistry, biochemistry, physiology, and mathematics. Students complete five courses in nutritional sciences: NS 115 Nutrition and Health Concepts and Controversies, NS 245 Social Science Perspectives on Food and Nutrition, NS 345 Nutritional and Physicochemical Aspects of Foods, NS 351 Physiological and Biochemical Bases of Nutrition, and NS 332 Methods in Nutritional Sciences. In addition, students select a minimum of three advanced courses in nutritional sciences as well as elective courses in the broad areas of food processing, food and rural sociology, and the life sciences.

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

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

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

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

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

**Plant Sciences**

Plant sciences students can specialize in plant biology, plant genetics and breeding, plant pathology, plant protection, or horticultural sciences, including floriculture and ornamental horticulture, and fruit and vegetable science. Students with well-defined interests upon arrival at Cornell can specialize in one of these programs beginning as freshmen when they enter college. Others may prefer to start in the general plant sciences curriculum and specialize after they have had a chance to explore the program offerings in the plant sciences.

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

**General plant science** is intended for students whose interest in studying plants has not yet centered on any one of the specializations 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, excellent opportunities for general plant science graduates at the bachelor's degree level in the service and supply industries, as extension agents, as teachers, and as research technicians.

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

Undergraduates are encouraged to obtain practical experience, which may involve internship and/or research under the direction of a faculty member or work in a commercial industry, research institute, a botanical garden or arboretum, nursery, greenhouse, or farm operation. Departments will assist students in finding positions that will provide useful experience.
Floriculture and ornamental horticulture applies principles of plant science and business management to the production and marketing of florist, nursery, and turfgrass crops, as well as to the selection and management of both indoor and outdoor landscapes. Programs prepare students for careers at the professional and managerial levels in horticultural business, botanical gardens and arboretum, research, teaching, communications, and extension and public education.

The core curriculum consists of the following courses:

**HORT 101, Introduction to Horticultural Science**

**HORT 102, General Horticulture**

**HORT 230, Woody Plant Materials**

**HORT 243, (BIO PL 243), Taxonomy of Coleophyta**

**HORT 300 and 301, Garden and Interior Plants I and II**

**HORT 400, Principles of Plant Propagation**

**BIOL 241, Plant Biology (Introductory Biol)**

**BIOL 242, Plant Physiology (lecture)**

**BIOL 244, Plant Physiology (laboratory)**

**SCAS 260, Introduction to Soil Science**

**ENTOM 241, Applied Entomology**

**PLPA 241, Plant Disease and Disease Management or PL PA 301, Introductory Plant Pathology**

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

With permission of the adviser, a transfer student may receive core curriculum credit for similar courses taken at other institutions provided that transfer credit is granted by the College of Agriculture and Life Sciences. In addition, all transfer students must complete a minimum of 12 credits in floriculture and ornamental horticulture courses at Cornell.

No more than two of the following landscape architecture courses may be included in this 12-credit requirement: LA 142, 310, 312, 480, 491. No other landscape architecture or tree and shrub drawing courses may be applied to this requirement because they do not contain horticultural subject matter.

Students may select an area of emphasis in either floriculture or landscape horticulture, or they may study generally across the specialization. Concentration in floriculture prepares students for careers in management of florist and greenhouse crop production, crops in controlled environment agriculture, and wholesale and retail florist marketing.

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

Working with his or her faculty adviser, each student will tailor a program to achieve individual educational objectives in floriculture, landscape horticulture, horticultural business management, or general horticultural science. A core of management courses also is strongly recommended for students planning on careers in business. Students are also encouraged to take courses in these areas: agricultural and biological engineering, soil science, computer science, ecology, entomology, geology, plant breeding, plant pathology, plant physiology, ornamental horticulture, turfgrass management, exterior and interior landscape contracting and service, plant pathology, and general horticulture.

Students for careers in nursery crops. Some students may be arranged across two specialization areas. Students wishing to prepare for graduate study in horticultural science may develop a program in basic sciences and their application in horticultural science. Lists of recommended courses for the areas of specialization are available from student advisers and from the undergraduate program coordinator.

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Job opportunities for graduates can be found in vegetable production. The high value of vegetables in tropical countries is driving a change toward farming practices that depend less upon agricultural chemicals than in the past. New technologies are being developed and implemented to help growers make this change while remaining profitable. Among these technologies are: integrated pest management, genetic engineering, breeding for insect and disease resistance, low-input and organic cropping systems, and cultural practices that improve production efficiency and conserve agricultural resources.

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

**Rural Sociology**

Technological, economic, demographic, and environmental changes are social processes, and each has major impacts on individuals, social groups, societies, and the international order. At Cornell, rural sociology students study these and other facets of social change in both domestic and international settings. Among the topic areas in which faculty members in the Department of Rural Sociology specialize are international agricultural and rural development, community and regional development and change in the United States, environmental sociology, aging and the life course, sociology of agriculture, rural industrialization and labor markets, technology and social change, population and development, political economy, women in development, race and ethnic relations, and research methodology.

Most courses provide background in both domestic and international aspects of the subject matter. Normally, students will develop a specialization with either a domestic or international emphasis by choosing appropriate elective courses. All students learn the theory and methodology of sociology, as applied both to research and policy in their subject areas.

Recognizing that students are concerned with future career opportunities, the undergraduate program emphasizes acquisition of skills as well as general knowledge in preparation for jobs or further study upon graduation. Accordingly, students are expected to become involved in the application of theory, methodology, principles, and concepts in the analysis of practical problems.

Rural sociology offers degree programs at both the undergraduate and graduate levels (B.S., M.S., M.P.S., or Ph.D.). These programs are offered through the Department of Rural Sociology and the Graduate Field of Development Sociology, both of which are located in Warren Hall. For many years, the department and graduate field have been recognized as among the top programs in the country, and both are known for innovative program orientations.

The department is particularly well known for providing instruction in international as well as domestic aspects of community and regional development, environmental sociology, sociology of agriculture, population studies, and other topics. Faculty members in this department are committed to both quality instruction and research programs. All college of agriculture, faculty members maintain strong ties with the technical fields in the college as well as with the International Agriculture Program, the Biology and Society Program, the Cornell Institute for Social and Economic Research, the Community and Rural Development Institute, the Gender and Global Change Program, the Life Course Institute, the Rural Development Program, the Hispanic Studies Program, the Science, Technology, and Society, and the Center for International Studies. Nearly half of the department faculty are associated with one or more area studies programs (the Southeast Asia Program, South Asia Program, Latin American Studies Program, East Asia Program, or the Institute for African Development). Department members also maintain working relations with faculty in the Department of Sociology and other social sciences located in other colleges at Cornell. Students are encouraged to supplement their course work by electing courses in these other departments and programs, thereby rounding out their educations by acquiring different perspectives.

The courses offered in rural sociology can be grouped in three broad categories: development sociology, population, environment, and society; and social data and policy analysis. All students majoring in Rural Sociology are required to take five core courses: an introductory course (R SOC 101), methods (R SOC 213), theory (R SOC 301), social stratification (R SOC 370), and a course in statistics. Four elective courses are also required of all majors.

**The focus area in development sociology** provides an understanding of the processes and policies that influence social and economic development in rural settings in North America and low-income countries in the developing world. Courses provide background in the sociology of development in both the advanced and developing countries. Students normally select a set of elective courses in which either domestic or international development is emphasized. These courses provide background in several aspects of development sociology, including (1) an understanding of the processes of socioeconomic development in low-income or Third World countries and the formulation of strategies to enhance the socioeconomic well-being of citizens of these countries, (2) analysis of the social structures and processes for development in nonmetropolitan settings in the United States, (3) analysis of the processes of agricultural change and development in industrialized and low-income countries, and (4) an understanding of the processes of technological development and change in the structure and other rural industries in developed and developing countries.

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

**Courses in the population, environment, and society focus area** provide an understanding of (1) the consequences of the major components of population change—fertility, mortality, and migration; (2) the major patterns of population distribution and population characteristics in the United States and the developing world; (3) the relationships between social structure and the biophysical environment, (4) the relationships between population change and natural resource utilization in development, and (5) impacts of public policy interventions on population size, growth and composition or on natural resource availability and environmental quality. Students normally select the elective courses for the major in such a way as to study either population studies or sociological aspects of natural resources and the environment.

Students are encouraged to complement courses in the department with course work in demographic methods, household analysis, ecology and evolution, environmental studies, natural resources, and computer applications. Some of the options in these areas are required of all majors.

**Courses in the social data and policy analysis focus area** provide (1) knowledge of research methodology, statistics, and computer applications, (2) an understanding of social, economic, political, and historical concepts essential for conducting meaningful analyses of practical problems and issues faced by organizations, communities, regions, and states, and (3) knowledge and practice in policy analysis. Students ordinarily select...
electives in order to specialize in either policy analysis or in a particular area of public policy (international development policy, domestic rural development policy, environmental policy, or others). Students are encouraged to complement courses in the department with course work in data collection and research design, evaluation research, computing, and advanced statistics.

**Soil, Crop, and Atmospheric Sciences**

The Department of Soil, Crop, and Atmospheric Sciences provides instruction in five specializations: atmospheric science, agronomy, crop science, soil science, and weed science. Employment opportunities are increased with practical experience, which is emphasized in the laboratories of our beginning courses. For students wishing additional credentials, preparation for professional certification is provided in all five specializations.

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

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

**Crop science** is the application of basic biological and ecological science to the improvement and management of the world's main field crops intended for human food and livestock feed. Courses required include 18 credits of crops, 12 credits of plant biology, and 6 credits of soils. Students who anticipate a career in production for service after completion of the B.S. degree should take additional courses in economics, communication, plant pathology, entomology, and nutrition. Students planning graduate or professional schools should take advanced course work in organic chemistry and biochemistry, calculus, physics, and statistics.

**Soil science** is a basic discipline important in ecology, engineering, agriculture, and conservation. The curriculum in soil science combines physical and biological training to address critical issues in environmental and agriculture management related to soils. Students take 18 credits in soil science, including 4 credits in the introductory course. In addition, chemistry, mathematics, physics, and microbiology are required, as well as 6 credits of crop science to satisfy the major.

**Weed science** is that branch of pest management which emphasizes the principles and practice of weed control. The scientific basis for mechanical, cultural, chemical, and biological control procedures is considered. Plant physiology, organic chemistry, biochemistry, soil science, and plant taxonomy are required in addition to twelve credits in weed science and plant protection. The specialization is offered cooperatively by the departments of Soil, Crop, and Atmospheric Sciences, Floriculture and Ornamental Horticulture, and Vegetable Crops so that a variety of managed plant systems may be studied.

**Special Programs in Agriculture and Life Sciences**

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

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

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

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

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

**ACADEMIC HONORS**

The college encourages high academic achievement and recognizes outstanding students in several ways:

**Dean's List.** Each semester, students are recognized for academic excellence by inclusion in the Dean's List. The criteria are subject to change from semester to semester, and can be obtained from the Office of the Registrar or the Office of Student Services, 140 Roberts Hall.

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

**Bachelor of Science with Honors.** Students will graduate with a bachelor of science degree with honors when, in addition to having completed all the graduation requirements, they have satisfactorily completed the honors program in their area of interest and have been recommended for the degree by the honors committee of that area. Special requirements are given in the section on the Honors Program.

**Ho-Nun-De-Kah,** founded in 1929, is the undergraduate honor society of the College of Agriculture and Life Sciences. Members are recruited from the top 20 percent of the senior class and top 10 percent of the junior class. In keeping with the ideals of encouraging scholarship, leadership, and citizenship, members provide free tutoring and a variety of service activities to both the college and the community.

**Gamma Sigma Delta** is an honor society of the faculty in the Colleges of Agriculture and Life Sciences, Human Ecology, and Veterinary Medicine. The common bond is promotion of excellence in work related to the quality of our environment and life based on "agriculture and the related sciences." The Cornell Chapter recognizes the academic achievements of students, faculty, and alumni of those colleges with nominations for membership and with special awards. To be eligible, seniors must be in the upper 15 percent of their major. Five juniors with the highest
This course, taught in Washington, D.C., forms with the internship. A learning contract is negotiated between the core of the Cornell-in-Washington office, 131, Sage Hall.

ALS 661 Environmental Policy (also Biology and Society 461 and BIOES 661)
FALL and SPRING. 3 credits each term. Students must register for 6 credits each term since an "R" grade is given at the end of the fall term.) Limited to 12 students. Prerequisite: permission of instructor. SEM R 2:30-4:30 p.m. D. Pimentel. This course uses an interdisciplinary approach to focus on complex environmental and policy issues. Ten to twelve students, representing several disciplines, investigate significant environmental problems. The research team spends two semesters preparing a scientific report for publication in Science or BioScience.

Related Courses in Another Department
Agriculture, Science and Society (HIST 233)
Seminar in the History of the Agricultural Sciences (HIST 867)

AGRICULTURAL AND BIOLOGICAL ENGINEERING

Note: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

ABEN 102 Introduction to Microcomputer Applications
FALL. 3 credits. S-U grades optional. Each lab section limited to 16 students. All students, including those pre-enrolled, must attend the first lecture to guarantee admittance to the course. LEC, T 10:10 or 12:20, lab M 1:25-4:25 or 7:30-10:30 p.m. or T 1:25-4:25 or W 1:25-4:25 or 7:30-10:30, or W 1:25-4:25. 1 evening prelim. P. E. Hillman.
Introduction to application packages on microcomputers. A laboratory, using the Macintosh, provides hands-on experience with word processing, spreadsheets, and database managers. These packages and others such as desktop publishing, telecommunications, statistics, and presentation graphics are discussed and demonstrated in the lecture, as well as computer hardware and DOS.

ABEN 104 Introduction to Programming using Pascal and FORTRAN
SPRING. 4 credits. Each lab section limited to 20 students. S-U grades optional. LEC, T 11:15 a.m. or W 12:20-2:15. P. E. Hillman. An introductory course in computer programming using microcomputers to handle data. Topics include preparing and processing programs in Pascal and FORTRAN. Students are expected to spend 5 to 8 hours outside their scheduled laboratory periods to complete problem sets. No prior knowledge of computers or computer language is necessary.

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

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

ABEN 151 Introduction to Computing
FALL. 4 credits. Prerequisite Math 191 or equivalent or co-registration permissible. LEC, T R 11:15; lab T W or R 2:30-4:30, rec M 7-8, W 7-8, or R 6-8. Each lab and recitation section limited to 22 students. D. J. Aneshansley.
An introduction to computer programming and concepts of problem analysis, algorithm development, and data structure in an engineering context. A structured programming language is used, implemented on interactive personal computers, and applied to problems of interest in agricultural and biological engineering. No previous programming experience is assumed.

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

ABEN 200 Undergraduate Seminar
A forum to discuss the curriculum requirements of the academic programs in the agriculture and biological engineering department and the contemporary and future role of agricultural and biological engineering in society. A required course for freshmen majors in Agricultural and Biological Engineering academic programs. A series of seminars will be given by practicing engineers, Cornell faculty members, alumni of the department,
includes psychrometric processes, energy balances, ventilation design (mechanical and natural), and heat flow. Other topics may include functional layout and design, waste management, economic analysis, and linear programming of agricultural production systems. The course is designed for juniors and seniors in the ABEN Technology Programs. Animal Science, General Studies and General Agriculture students.

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

ABEN 367 Introduction to Biological Engineering
Spring. 3 credits. Prerequisites: one year each calculus and introductory biology; minimum one term each college chemistry and physics. Not open to freshmen. S-U grades optional. Lee, M W F 9:05; lab, R 2:30-4:25. M. B. Timmons
Explores the use of engineering principles to solve biological problems in the context of laboratory experiments. Topics may include artificial organs, neuromuscular electrical stimulation, artificial heart valves, enzyme catalysis, fermentation kinetics, and DNA transfer. Many topics relate to ongoing research at Cornell. Appropriate for engineering and life science students. Field trips, demonstrations, and readings in current scientific literature.

ABEN 371 Hydrology and the Environment (also Soil, Crop, and Atmospheric Sciences 371 and Geology 371)
Introduction to hydrology: the hydrologic cycle and the role of water and chemicals in the natural environment. Includes precipitation, infiltration, evapotranspiration, ground water, surface runoff, river meandering, floods, and droughts. Case studies, short field trips, computer programs, and laboratories foster an understanding of concepts and principles of hydrologic processes.

ABEN 396 Fundamentals of Engineering Design
Spring. 2 credits. Lecs. T R 11:15. S. G. Capps
Fundamentals of design course for junior-level students. Topics and skills discussed will include time and team management, teamwork, design constraints, design problem definition and specification, project scheduling, materials selection, cost analysis, ethics, and design evaluation.

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

ABEN 435 Principles of Aquaculture
Spring. 3 credits. Prerequisite: junior standing and above. Lec. T R 1:25-2:15; lab, R 2:30-4:25. M. B. Timmons
An in-depth treatment of the principles of aquaculture: fish biology, waste treatment, engineering design, fish health, nutrition, processing, etc. This course is intended to build upon the undergraduate's previous course background and interests. Supervised "hands-on" laboratory experiences.

ABEN 450 Instrument Design: Signal Processing and Data Acquisition
Fall. 3 or 4 credits. 3 prerequisites: Linear Differential Equations, physics or electrical science, computer programming and use of spreadsheet. Lecs. W M F 9:05; lab M W 2:00-4:25. D. J. Aprahamian
An introduction to static and dynamic characteristics of electronic sensors, transducers, digital and analog signal conditioning circuits and conversion techniques, data acquisition and instrument control with personal computers considered. Biological and agricultural examples of instrument problems and designs are used. A capstone design project is an option with this course, see instructor for details.

ABEN 455 Biomass Conversion: Processes for Energy and Chemicals
Spring. 3 credits. Prerequisites: ABEN 250 and 350, MATH 294, Thermodynamics (co-registration permissible), and CHEM 211. Lecs. M W F 9:05. L. P. Walker
A variety of physical and biological processes are available for converting plants and other biomass resources into fuels, industrial chemicals, and foods. The design of these processes is accomplished through fusing concepts from biochemistry, microbiology, and plant biology with the concepts and methods of engineering. There are five major components to this course: plants as biochemical resources, heat and mass transfer, enzyme catalysis, fermentation kinetics, and biological filtration with plants. The last four components are concluded with case studies that demonstrate how the scientific and engineering concepts are used to design a biomass conversion process.

ABEN 453 Computer-Aided Engineering: Applications to Biomaterials and Food Processing
Spring. 3 credits. Prerequisite: Computer programming and heat and mass transfer (ABEN 350 or equivalent). Lecs. M W F 11:15; computer laboratory to be arranged. A. K. Datta
Design, optimization, and analysis of complex real-life processes using state-of-the-art physics-based computational software as powerful tools that are easy to use. Industrial biological and food processing applications of heat and mass transfer are covered in topics such as heat sterilization, freezing, and dehydration. Computational topics introduce
finite-difference and finite-element methods, convergence, stability, accuracy, pre-and post-processing, and pitfalls of using computational software. Term project encourages students to develop own ideas, including work related to research projects or other courses not involving such computation.

ABEN 454 *Physiological Engineering* Fall. 3 credits. Prerequisites: Introductory biology, computer programming. Corequisite: fluid mechanics. Lecs, T R 12:20, lab T R 1:25–4:25. R. E. Pitt. Engineering analysis and design in the physiology of animals and humans. Topics include osmometric behavior of cells, cardiovascular control models, mechanical operation of the heart, sensory ecology, neural transmission, EEGs, physiology of sight, bioacoustics, respiration, whole-animal models, and the fluid mechanics of flying and swimming. Laboratories involve experiments, computer applications, field trips, and guest lectures.

ABEN 471 *Geohydrology (also Civil and Environmental Engineering 431 and Geology 445)* Fall. 3 credits. Prerequisites: Mathematics 294 and Engr 202. 2 lecs, 1 disc, lecture, field trip. W. Bruslut, L. M. Cathles, T. J. Y. Parkhuis. Intermediate-level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.

ABEN 473 *Watershed Engineering* Fall. 3 credits. Prerequisite: Fluid Mechanics or Hydrology. Lecs, T R F 9:05; disc, R 1:25–4:30. M. F. Walter. Engineering principles are applied to the design of soil and water management technologies aimed at solving natural resource problems in the context of watersheds. Emphasis will be placed on rural and countryside engineering and small-scale design for soil erosion control, flood damage control, earthen dams, ponds, moisture conservation, drainage, irrigation, and water supply.

ABEN 474 *Drainage and Irrigation Design* Spring. 3 credits. Prerequisites: Fluid Mechanics or Hydrology. Lecs, T R F 12:20. T. S. Steenhus, L. D. Geohring, and M. F. Walter. This course will focus on design of drainage and irrigation systems for agriculture and non-agricultural purposes. The course will also briefly cover design for rural water supply and sanitation systems. Emphasis is placed on problem solving with actual situations used whenever possible. Completion of major design project is required of each student.

ABEN 475 *Environmental Systems Analysis* Fall. 3 credits. Prerequisites: computer programming and one year of calculus. Lecs, M W F 1:25. D. A. Haith. Systems analysis and its use in environmental quality management. Emphasis is on modeling of environmental problems, translation of models into efficient computational algorithms, and use of computer simulation and optimization procedures (search techniques, linear programming, dynamic programming, and separable programming) to evaluate management alternatives. Applications include pollution control and resource management problems.

ABEN 476 *Solid Waste Engineering* Spring. 3 credits. Prerequisites: 1 year of physics; 1 semester of chemistry. Lecs, M W F 1:25. D. A. Haith. Planning and design of processes and facilities for management of municipal solid wastes. Source characterization and reduction; collection and transport systems; waste-to-energy combustion; sanitary landfills; composting; recycling and materials recovery facilities; hazardous waste management. Emphasis on quantitative analyses.

ABEN 477 *Treatment and Disposal of Agricultural Wastes* Spring. 3 credits. Prerequisites: One environmental science course and at least junior-level standing; or permission of instructor. T R 2:30–3:45. W. J. Jewell. Overview of pollution problems in agriculture, legal restrictions, and technologies used to control pollution. Biological, physical, and chemical processes are applied to solve problems associated with animal wastes, food production, and food and fiber processing.

ABEN 481 *Design of Wood Structures* Spring. 3 credits. Prerequisites: ENG 202. Lecs, M W F 10:10. K. G. Megremeshin. Computer-aided and manual computation procedures of engineering wood structures. Topics include national design codes; estimation of design loads (dead, live, wind, snow, and seismic loads); mechanical properties of materials; designs of beams, columns, trusses, frames, arches, shear walls, horizontal diaphragms of post-frame buildings, connections, and special wood (glue-laminated) structural systems. Engineering judgment and individual responsibility in engineering design are also emphasized.

ABEN 482 *Bioenvironmental Engineering* Spring. 3 credits. Prerequisites: ABEN 250 and 350, or equivalent. Lecs, T R 11:15; lab, W 1:25–4:25. L. D. Albright. Analysis and techniques to modify the thermal and aerial environment of animals and plants. Environmental requirements of animals and plants, and the design of buildings to act as buffers between biological systems and climate. Heat flow, air flow, psychrometrics, energy balances, temperature biology, animal and plant models, thermal modeling, mechanical and natural ventilation, solar energy, and weather phenomena.

ABEN 491 *Highway Engineering (also Civil and Environmental Engineering 362)* Fall. 3 credits. Prerequisites: junior standing in engineering, fluid mechanics, and soil mechanics (may be taken concurrently). Lecs, F 1:25–4:25; lab, M 1:25–4:25. L. H. Irwin. An introduction to highway engineering with an emphasis on design. Students will work in teams to apply the current standards and design criteria used in professional practice to several highway design projects. Topics of discussion include route location and design, traffic engineering, economic analysis, human factors and public safety, hydrology and drainage design, highway materials, pavement design, and maintenance.

ABEN 494 *Special Topics in Agricultural and Biological Engineering* Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged. Staff. The department teaches "trial" courses under this number. Offerings vary by semester and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

ABEN 496 *Senior Design in Agricultural and Biological Engineering* Fall and spring. 1–3 credits. Prerequisite: ABEN 390 or co-registration, and senior standing in ABEN engineering program or permission of instructor. Note: Completing an independent study form is required to register. Hours to be arranged. Staff. Involves capstone design experience, including a team project, incorporating analysis, design, evaluation, synthesis, and a written report of the end-product. This course may be taken in conjunction with an approved ABEN course (for an approved ABEN course, see ABEN Undergraduate Program publication).

ABEN 497 *Individual Study in Agricultural and Biological Engineering* Fall and spring. 1–4 credits. S-U option. Prerequisite: written permission of instructor and adequate ability and training for the work proposed. Normally reserved for seniors in upper two-fifths of their class. Students must register with an independent study form (available in 140 Roberts Hall). Hours to be arranged. Staff. Special work in any area of agricultural and biological engineering on problems under investigation by the department or of special interest to the student, provided, in the latter case, that adequate facilities can be obtained.

ABEN 498 *Undergraduate Teaching* Fall and spring. 1–4 credits. Prerequisite: written permission of instructor. Students must register with an independent study form (available in 140 Roberts Hall). Hours to be arranged. Staff. The student assists in teaching an agricultural and biological engineering course appropriate to his/her previous training. The student meets with a discussion or laboratory section, prepares course materials, grades assignments, and regularly discusses objectives and techniques with the faculty member in charge of the course.

ABEN 499 *Undergraduate Research* Fall and spring. 1–3 credits. Prerequisites: normally reserved for seniors in upper two-fifths of their class. Adequate training for work proposed. Written permission of instructor. Students must register with an independent study form (available in 140 Roberts Hall). Hours to be arranged. Staff. Research in any area of agricultural or biological engineering on problems under investigation by the department or of special interest to the student, provided that adequate facilities can be obtained. The student must review pertinent literature, prepare a project outline, carry out an approved plan, and submit a formal final report.
ABEN 501-502 M.P.S. Project
Fall and spring. 3-6 credits. Required of each M.P.S. candidate in the field. Hours to be arranged. ABEN graduate faculty.
A comprehensive project emphasizing the application of agricultural technology to the solution of a real problem.

ABEN 551-552 Agricultural and Biological Engineering Design Project
Fall and spring. 3-6 credits. Prerequisite: admission to the M.Eng. (Ag.) degree program. Hours to be arranged. ABEN graduate faculty.
Comprehensive design projects dealing with existing engineering problems in the field. Emphasis is on the instructor. Of alternative design proposals that include consideration of economics, nontechnical factors, engineering analysis, and complete design for the best design solution. Projects are supervised by faculty members on an individual basis. However, there is a formal orientation during the first four weeks of the semester. A formal report and public presentation of the results of the design project are required for completion of the course. A minimum of 12 credits of 551-552 is required for the Master of Engineering degree. Students should register for 551 their first semester and complete any additional design project credits with 552. If more than 6 design project credits are desired in one semester, both 551 and 552 may be taken.

ABEN 652 Instrumentation: Sensors and Transducers
Spring. 3 credits. Prerequisites: Linear differential equations, introductory chemistry, and introductory physics, or permission of the instructor. Not offered 1995-96. D. J. Aneshansley.
Application of instrumentation concepts and systems to the measurement of environmental, biological, and agricultural phenomena. Construction and characteristics of electronic sensors and transducers will be emphasized. Image processing techniques will be introduced. A final project is required.

ABEN 655 Thermodynamics and Its Applications
Spring. 3 credits. Prerequisites: Mathematics 293 or equivalent. Lecs, M W F 12:20. J. Y. Farlange.
Thermodynamics and its applications to problems in engineering and agriculture. Topics include basic concepts (equilibrium, entropy, processes, systems, potentials, stability, phase transitions) and applications (soil and water processes, dilute solutions, electromagnetism, surface phenomena, heat and mass transport, structure of organizations).

ABEN 671 Analysis of the Flow of Water and the Chemicals in Soils
Fall. 3 credits. Prerequisites: four calculus courses and fluid mechanics. Lecs, R 3:35-4:50. J. Y. Farlange.
The course encompasses the full range from simple to complex methods to describe the chemical and water flows on the surface, in the vadose zone, and through the aquifer. Current analytical, semi-analytical, and computer-based techniques are discussed. Both homogeneous and heterogeneous soils are analyzed. Offered alternately with Civil and Environmental Engineering 653—a complementary, but not identical, course.

ABEN 672 Drainage
Theory of water and solute flow in aquifers, hillside, and the vadose zone as it relates to artificial drainage is discussed. Drainage design as it relates to agricultural land, landfills, and land application sites will be critically reviewed. The importance of preferential flow and matrix flow on water quality of drainage waters is examined. Laboratory work consists of hands-on experience with measuring soil parameters and for actual drainage design.

ABEN 677 Treatment and Disposal of Agricultural Wastes
Spring. 3 credits. Prerequisite: permission of instructor. Lecs, T R 2:30-3:45. W. J. Jewell.
Emphasis is on the causes of agricultural waste problems and the application of fundamentals of treatment and control methods to minimize related pollution. Fundamental, of biological, physical, and chemical pollution control methods are used in design problems with animal wastes, food production, and food and fiber processing. A semester-long design project is required.

ABEN 678 Nonpoint Source Models
Spring. 3 credits. Prerequisites: computer programming and calculus. Lecs, M W F 2:30. D. A. Halth.
Development and programming of simulation models for management of water pollution from runoff and percolation. Emphasis is on prediction of water and chemical inputs to surface waters and groundwater. Applications include urban and rural runoff, lake eutrophication, groundwater waste loadings from land disposal sites, pesticides and nutrients in agricultural drainage, irrigation return flows, and watershed stream flow and sediment yield.

ABEN 685 Biological Engineering Analysis
Spring. 4 credits. Prerequisites: T&M 310 or permission of instructor. Lecs, M W F 11:15. J. R. Cooke.
Engineering problem-solving strategies and techniques study models of several representative engineering problems that inherently involve biological properties. Emphasis is on formulation and solution of mathematical models and the interpretation of results. The student's knowledge of fundamental principles is used extensively.

ABEN 692 Pavement Engineering (also Civil and Environmental Engineering 643)
Spring. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: one introductory course in soil mechanics or highway engineering. Lecs, M W F 2:30-4:25. L. H. Irwin.
Application of geotechnical engineering principles to the selection of materials and the design of highway and airfield pavements, computer-based methods for pavement design, structural evaluation of pavements, and pavement systems management. Topics of discussion will include bituminous mixture design; base stabilization methods; seal coat design; design of flexible and rigid pavements; pavement design for frost conditions; and pavement evaluation using nondenstractive test methods. Laboratory will provide a case study of pavement systems management.

ABEN 694 Graduate Special Topics in Agricultural and Biological Engineering
Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged. ABEN graduate faculty. 
The department teaches "trial" courses under this number. Offerings vary by semester, and will advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

ABEN 697 Graduate Individual Study in Agricultural and Biological Engineering
Fall or spring. 1-6 credits. Prerequisite: permission of instructor. S-U grades only. Hours to be arranged. ABEN graduate faculty.
Topics are arranged by the staff at the beginning of the term.

ABEN 700 General Seminar
Fall. No credit. S-U grades only. (Time to be announced). Staff.
Presentation and discussion of research and special developments in agricultural and biological engineering and related fields.

ABEN 750 Orientation for Research
Fall. 1 credit. Limited to newly joining graduate students. S-U grades only. Lecs, first 7 weeks, R 3:35; remainder to be arranged. J. A. Bartsch.
An introduction to departmental research policy, programs, methodology, resources, and degree candidates' responsibilities and opportunities.

ABEN 754 Sociotechnical Aspects of Watershed Development (also ARME 754 and Government 644)
Examines watershed development and its role in agriculture, irrigation and other activities within its boundaries. Emphasis on social, technical and economic processes within watersheds, including political and administrative aspects. Provides an opportunity to examine systematically the interactions of various aspects of watershed management and design in developing countries.

ABEN 771 Soils and Water Engineering Seminar
Fall and spring. 1-3 credits. Prerequisite: graduate status or permission of instructor. S-U grades optional. Hours to be arranged. T. S. Steenhuis.
Study and discussion of research or design procedures related to selected topics in irrigation, drainage, erosion control, hydrology, and water quality.

ABEN 775 Agricultural Waste Management Seminar
Spring. 1 credit. Limited to graduate students. Prerequisite: permission of instructor. S-U grades only. Hours to be arranged. Staff.
Management of agricultural wastes, with emphasis on physical, chemical, biological, and economic factors affecting waste production, treatment and handling, utilization, and disposal.
Resource economics: 250, 450, 652, 750, 751, 754
Economics of development: 464, 660, 665, 763
General, contemporary issues, research, and other: 100, 380, 494, 497, 498, 499, 694, 698, 699, 700

Note: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

ARME 220 Introduction to Business Management
Spring. 3 credits.
Lecs, M W F 11:15–12:05.
W. D. Schulze
The course begins with a survey of economic principles and then applies economic analysis to global issues such as: economic growth and the short and long term availability of natural resources; agriculture and population growth; business management, international trade, and global markets; and issues of global environmental management.

ARME 221 Financial Accounting
Spring. 3 credits.
Lecs, M F 11:15–12:05 or 12:20–1:10; sec, T 10:10–12:05 (2 secs); W 12:20–2:15; or 2:30–4:25; W 10:10–12:05 (2 secs); T 9:30–11:25; 7:30–9:25 p.m. (2 secs); T 8:30–9:55, or 2:30–4:25; W 10:10–12:05, 12:20–2:15, 2:30–4:25 (2 secs); or 7:30–9:25 p.m. (2 secs); R 9:55 or 2:30–4:25. In weeks when discs are held there will be no W lecture. 2 evening prelims. Staff.
An overview of management and business. Provides exposure to key management functions, a firm's internal and external environments, business ethics, forms of business ownership, some key concepts and tools in human resource management, financial management and marketing and important current issues such as quality, global competition, and corporate governance. Several guest executives.

ARME 240 Marketing
Fall. 3 credits.
Lecs, M W F 10:10–11; disc, M 2:30–4; T 12:20–1:50 or 2:30–4 (2 secs); W 2:30–4 (2 secs); R 12:20–1:50 (2 secs) or R 2:30–4 (2 secs); or F 10:10–11:40. 5 discussion sections are held during the semester. In weeks discussions are held, there will be no F lecture.
E. W. McLaughlin.
This course provides a broad introduction to the fundamentals of marketing. We will explore the components of an organization's strategic marketing program, including how to price, promote, and distribute goods, services, ideas, people, and places. We will examine specifically the central role played by changing consumers; our primary emphasis will be placed on contemporary industries. Although examples will frequently be drawn from the food and agricultural system, the principles and concepts from this course will apply equally well to the marketing of goods and services in all sectors of the economy. Case studies, industry guest lectures, and current marketing applications from various companies will be presented and analyzed.

ARME 250 Natural Resource and Environmental Economics
Spring. 3 credits.
Lecs, T R 2:30–3:45.
D. Chapman.
An introduction to the concepts and methods of analysis of resources. Subjects include the valuation of environmental resources and benefit-cost analysis. Major current economic problems such as economic incentives in environmental policy, endangered species protection, forestry, energy use, world petroleum resources, and global warming. The growing world trade in resource-intensive manufactured products and the impact on employment, and pollution. Comparative resource use and environmental protection in industrialized and developing countries.

ARME 302 Farm Business Management
Fall. 4 credits.
Not open to freshmen.
This course is a prerequisite for ARME 402 and 405. Lecs, M W F 1:00–5:55, sec, W or R 1:25–4:25. On days farms are visited, the section period is 1:25–6:00.
W. A. Knoblauch.
An intensive study of planning, directing, organizing, and controlling a farm business, with emphasis on the tools of managerial analysis and decision making. Topics include financial statements, business analysis, budgeting, and acquisition, organization, and management of capital, labor, land, buildings and machinery.

ARME 310 Introductory Statistics
Fall, spring, or summer. 4 credits.
Prerequisite: EDUC 115 or equivalent level of algebra. Lecs, M W F 1:25–2:15; sec T 10:10–12:05, 12:20–2:15, or 2:30–4:25 (2 secs); W 11:15–1:10 or 2:30–4:25 (2 secs); or R 12:20–2:15 or 2:30–4:25 (2 secs). 3 evening prelims. C. van Es.
An introduction to statistical methods. Topics to be covered include the descriptive analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, and correlation analysis. Applications from business, economics, and the biological sciences are used to illustrate the methods covered in the course.

ARME 320 Business Law I
Fall. 3 credits.
Consideration is given chiefly to legal problems of particular interest to persons who expect to engage in business. Emphasis is on the law pertaining to contracts, sales, agency, property, and the landlord-tenant relationship.

ARME 321 Business Law II
Spring. 3 credits.
Limited to juniors, seniors, and graduate students. Prerequisite: a course in business law. Lecs, T R 8:30–9:55.
D. A. Grossman.
The first portion of this course examines legal issues in the formation and operation of business enterprises, particularly partnerships, corporations, and limited liability companies. The second portion of the course will review selected topics in business law, including employment discrimination, secured transactions, product liability, bankruptcy, and commercial paper.

ARME 322 Managerial Accounting
Fall. 3 credits. Prerequisite: ARME 221 or equivalent. Lecs, M W 12:20-1:10; disc, R 10:20-12:20 (2 secs), or 2:30-4:25 (2 secs), or F 10:10-12:05 or 12:20-2:15 (2 secs). 2 evening prelims, a third exam, and a project on an electronic spreadsheet. M. J. Hubbert.

ARME 324 Financial Management
Spring. 4 credits. Prerequisite: ARME 220 or equivalent. Recommended ARME 221 and/or equivalent. Lecs, M W F 9:05-9:55; disc, W 2:30-4:25 or R 9:05-11, 12:20-2:15, or 2:30-4:25, or F 10:10-12:05 or 12:20-2:15. 2 evening prelims.

B. L. Anderson.

Focuses on the major questions facing management: how to evaluate capital investment decisions, how to raise the capital to finance the firm, and how to generate sufficient cash flows to meet the firm's cash obligations. Major topics include methods to analyze investment decisions, impact of taxes, techniques for handling risk and uncertainty, effects of inflation, sources and costs of debt and equity, capital structure, leverage, and working capital management. Microcomputers are used for analyzing financial problems. Previous computer experience is preferred, but optional instruction offered.

ARME 325 Personal Enterprise and Small Business Management
Spring. 3 credits. Limited to juniors and seniors. Prerequisites: ARME 220 and 221 or permission of instructor. Absolutely no adds or drops after second class meeting. Lec and disc times to be announced.

D. Streeter.

Acquaints students with the changing role of small businesses in the global economy. Special emphasis on the problems of planning, starting, and managing a new business, including strategic planning, marketing, financing, and managing growth. Term project: development of a business plan, is done in groups assigned within discussion sections. Case studies and visiting entrepreneurs illustrate various small business issues.

ARME 340 Futures and Options Trading
Spring. 3 credits. Prerequisite: ECON 101. Open by application only. S-U grades optional. Not offered 1995-96.

Staff.

The focus of the course is on the use of agricultural financial futures and options as marketing and management tools. A primary objective is to understand how companies, financial institutions, and farm businesses can employ hedging strategies to manage risk.

Students will participate in a simulated trading exercise in which they will use real-time price and market information and input from industry experts to manage a hedge position.

ARME 342 Marketing Management
Spring. 3 credits. Limited to juniors, seniors, and graduate students. Prerequisites: ARME 240 and ECON 101-102.

Lecs, M W F 10:10-11; disc, R 12:20-1:10 (2 secs) or 2:30-3:20 (2 secs); F 10:10-11 (2 secs), or 12:20-1:10 (2 secs). In weeks discs are held, there will be no F lecture.

R. D. Oberle.

Deals with the central link between marketing at the societal level and everyday consumption by the general public. As such, this course emphasizes the management aspects of marketing by considering consumer behavior, strategies in product and brand selection, pricing, promotion, sales forecasting, and channel selection. Identification and generation of economic data necessary for marketing decisions are considered. Policy, political, and ethical dimensions of marketing are examined.

ARME 346 Dairy Markets and Policy
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: ECON 101 or equivalent. Offered alternate years. Offered spring 1996 and 1998. Not offered spring 1997.

Lecs, T R 8:30-9:55.

H. M. Kaiser.

A survey of the structural and institutional characteristics of dairy markets and the analysis of policy issues, pricing systems, and government programs, including marketing orders, price supports, and import policies.

ARME 347 Marketing Fruits, Vegetables, and Ornamental Products
Fall. 3 credits. S-U grades optional. A 2-day field trip. Estimated cost of field trip, $50. Lecs, M W F 12:20-1:10.

E. E. Figueroa.

A study of fruits, vegetables, and ornamental plant marketing, including seasonal variations. Role of market intermediaries, role of government agencies, and the price discovery process. Discussion and description of marketing programs of horticultural products of the U. S. The emerging importance of international and international markets.

ARME 380 Independent Honors Research in Social Science
Fall or spring. 1-6 credits. Limited to students who have met the requirements for the honors program. See "Honors Program" in CALS section of this catalog. Provides qualified students an opportunity to conduct original research under supervision. Information available in ARME undergraduate program office in Warren Hall.

ARME 402 Advanced Farm Business Management
Spring. 3 credits. Prerequisite: ARME 302 or equivalent. Lecs, M W 10:10-11; disc, W 1:25-3:20. R. A. Milligan.

Emphasis is on evaluating the profitability of alternative investments and enterprises. Principal topics include strategic planning, the effects of income taxes on investment decisions, capital investment analysis, computer applications to farm businesses, management linear programming, forms of business organization, and financial risk and uncertainty. Previous computer experience is not required.

ARME 403 Farm Management Study Trip
Spring. 1 credit. Prerequisite: ARME 302. Open by application only. Lecs, arranged. W. A. Knoblauch.

A special program to study production and management systems in diverse agricultural regions of the U. S. Includes a trip (usually taken during spring break) to the region being studied. A different region is visited each year. The course may be used to count part of the study trip and upon return from trip. A paper, selected by the student, which further explores an aspect of the trip, is a requirement for completing the course.

ARME 404 Advanced Agricultural Finance Seminar
Spring. 2 credits. Limited to 16 seniors with extensive coursework 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, a field trip to observe FHA financing during fall term, a four-day trip to financial institutions in New York City during intersession, and an actual farm case analysis in the spring term.

ARME 405 Farm Finance
Spring. 4 credits. Prerequisite: ARME 302 or equivalent. Lecs, M W F 9:05-9:55; disc, T 1:25-3:20. E. L. LaDue.

The principles and practices used in financing farm businesses, from the perspectives of the farmer and the farm lender. Topics include sources of capital, financing entry into agriculture, financial analysis of a business, capital management, financial statements, credit instruments, loan analysis, financial risk, and leasing.

ARME 406 Farm and Rural Real Estate Appraisal
Spring, weeks 7-15. 2 credits. Limited to 40 students. Prerequisites: ARME 302 or equivalent and permission of instructor. Lecs, R 11:15-12:15; sec, R 1:25-3:50.

6 half-day field trips, 1 all-day field trip.

G. J. Conneman.

The basic concepts and principles involved in appraisal. Factors governing the price of farms and rural real estate and methods of valuation are studied. Practice in appraising farms and other rural properties.

ARME 407 Financial Management in Farming
Fall. 2 credits. Limited to ALS majors. Prerequisite: ARME 405. Lecs, W M 1:25-2:15. J. R. Brander.

Financial markets and policies affecting agriculture and farmers. How money and capital markets affect credit cost and availability in agriculture. Insurance concepts for farmers. Financial considerations in starting to farm. Issues in choice of farm organizational structure. Present value concepts.

ARME 408 Seminar in Farm Business Decision Making
Fall (1 week in intersession). 1 credit. Prerequisites: ARME 302 and 405 or equivalent, and permission of instructor. M W T R F 8-5. G. J. Conneman.

Develops method of analyzing farm business management problems. Gives student experience in identifying alternatives in
The focus of the course is on information decision making techniques, examine problems that can be analyzed with business appreciation information systems, identify models presented enable the student to in business decision making. The computer budgeting, transportation and financial ing, blending, resource allocation, capital Standard LP problems such as work schedul­ ing, the emphasis will be on formulation, and report the results of an empirical estimate, and give experience in collecting and interpreting data.

ARME 410 Business Statistics
Spring. 3 credits. Prerequisite: ARME 310 or equivalent. Lecs, T R 10:10–11:25. L. S. Willett.

This course focuses on four major topics used to analyze data from marketing research, business, and economics. Topics studied are: survey sampling procedures, contingency table analysis, time series and forecasting, and experimental design and ANOVA. The course will involve a research project designed to give experience in collecting and interpreting data.

ARME 411 Introduction to Econometrics
Spring. 3 credits. Prerequisite: ARME 310 or equivalent. Lecs, T R 12:20–1:35. J. E. Pratt.

The course introduces students to basic econometric principles and the use of statistical procedures in empirical studies of economic models. Assumptions, properties, and problem estimation in the use of multiple regression procedures are discussed and simultaneous equation models are introduced. Students are required to specify, estimate, and report the results of an empirical model using econometric methods.

ARME 412 Introduction to Mathematical Programming
Fall. 3 credits. Primarily for juniors, seniors, and M.S. degree candidates. Prerequisite: ARME 310 or equivalent. Lecs, T R 12:20–1:35. J. L. Pratt.

This is a course in applied linear programming. Following a review of linear algebra, the emphasis will be on formulation, specification, and interpretation of solutions to mathematical models of economic problems. Standard LP problems such as work scheduling, blending, resource allocation, capital budgeting, transportation and financial planning, inventory management, etc., will be studied. Integer and nonlinear programming will be introduced, if time permits.

ARME 413 Information Systems and Decision Models
Fall. 3 credits. Limited to juniors and seniors. Prerequisites: ABEN 102 or equivalent, ECON 101 or equivalent, and ARME 310. Lecs, M W 10:10–11:10; lab, M 12:20–12:30 or 1:30–1:45; T 12:20–12:30 or 2:30–2:45. L. S. Willett.

The focus of the course is on information systems and the quantitative approaches used in business decision making. The computer models presented enable the student to appropriate information systems, identify problems that can be analyzed with business decision making techniques, examine problems using analytical techniques, and gain a perspective for critiquing the decision making process.

ARME 415 Price Analysis
Spring. 3 credits. Prerequisites: ECON 313 or CEH 210 or equivalent. ARME 310 or equivalent. Lecs, T R 2:30–4:45. H. M. Kalk.

The focus of this course is on the analysis of supply and demand characteristics of commodities with particular attention to agricultural products. Institutional aspects of pricing, temporal and spatial price relation­ ships, price forecasting, and the economic consequences of pricing decisions are included.

ARME 419 Expert Systems Workshop
Fall. 3 credits. Prerequisite: one computer use or programming course. Absolutely no adds or drops after second class meeting. Not offered fall 1995. Staff.

A hands-on introduction to the use of expert systems by business managers. Topics include the concepts behind knowledge-based applications, domain selection, knowledge engineering, representation, and processing, reasoning mechanisms, rule and object dynamics, and the integration of expert systems with quantitative models and computer databases. Students will work in groups to develop and implement a rudimentary expert system relevant to a contemporary business problem. Interested students need not be proficient in computer programming to take this course.

ARME 422 Estate Planning
Fall. 1 credit. Limited to juniors, seniors, and graduate students. S-U grades only. Lecs, M 3:35–4:25. D. A. Grossman.

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

ARME 424 Business Policy
Fall. 3 credits. Limited to seniors majoring in business management and marketing. T R 9:05–10:15, 11:15–12:45 or 2:30–4:00. R. D. Aplin.

An integrating course that examines business policy formulation and implementation from the standpoint of the general manager of an organization, focusing on decision making and leadership. The course is built around a series of cases. Several guest executives. Empha­ sizes improving oral and written communica­tion skills.

ARME 425 Small Business Counseling
Fall. 4 credits. Limited to seniors. Prerequisite: ARME 325 or NIA 300 and permission of instructor. Lecs, M W 2:30–4:25; disc, 2 hours per week, arranged. D. Streeter.

Students serve as counselors to small businesses in the central New York area and confront problems facing small personal enterprises. Encourages the application of business principles to an existing business and the witnessing of a firm-­level decision making. Student teams meet with the business owners and course staff at arranged times during the semester.

ARME 426 Cooperative Management and Strategies
Spring. 3 credits. Recommended: ARME 220 and 245. Estimated cost of field trip, $50. Lecs, M W F 12:20–1:10. 2 day field trip required. B. L. Anderson.

Investigates the unique aspects of cooperative, membership, and not-for-profit organizations.
This course examines the economic principles underlying international trade and monetary policy, and the policies, practices, and institutions that influence trade and foreign exchange markets. Applications to current topics in international policy, to trade in primary commodities, and to both developed and developing countries are also emphasized.

ARME 431 Food and Agricultural Policies
Fall. 3 credits. Prerequisite: ECON 313 or CEH 210 or equivalent. Not offered 1995-96. Staff.

The course will be closely tied with food and agricultural policies, including price support and storage or reserve policies, agricultural protection, soil conservation programs, the structure of agriculture, domestic food subsidy programs, environmental issues, and food safety. The importance of international trade and agricultural policies in other countries is emphasized.

ARME 432 Economics of the Public Sector
Spring. 3 credits. Prerequisite: ECON 313 or CEH 210 or equivalent. Not offered 1995-96. Staff.

The application of economic concepts to the 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.

ARME 443 Food-Industry Management
Fall. 4 credits. Limited to juniors and seniors. Prerequisite: ARME 448 or 452 or permission of instructor. Lecs, T R 9:05-10:35; sec. T 2:30-3:30. G. A. German.

A case-study approach is used to examine the application of management principles and concepts to marketing and distribution problems of the food industry. Cases covering new product introductions, merchandising strategies, and investment decisions are included. Guest speakers from the food industry present case-study solutions at the Tuesday session.

ARME 444 Food Marketing Colloquium
Fall. 1 credit. Limited to juniors and seniors. Prerequisite: ARME 446. Permission of the instructor. S-U grades only. R 3:35-5. G. A. German and E. W. McLaughlin.

ARME 446 and 447 have been developed as a two-semester special seminar that provides the weekly focus for the Food Marketing Fellows Program. The seminar will cover advanced topics in food marketing, many of which will have an important international dimension and will be presented by industry members. A number of field trips will be taken, including an international trip during January intersession and a five-day trip to the Food Marketing Institute Convention in Chicago during the first week in May. Students will prepare research topics on various aspects of the food industry.

ARME 446 Food Marketing Colloquium
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: ARME 240. Lecs, T R 12:20-1:35. G. A. German.

ARME 446 and 447 have been developed as a two-semester special seminar that provides the weekly focus for the Food Marketing Fellows Program. The seminar will cover advanced topics in food marketing, many of which will have an important international dimension and will be presented by industry members. A number of field trips will be taken, including an international trip during January intersession and a five-day trip to the Food Marketing Institute Convention in Chicago during the first week in May. Students will prepare research topics on various aspects of the food industry.

ARME 448 Food Merchandising
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: ARME 240. Lecs, T R 12:20-1:35. G. A. German.

ARME 448 and 447 have been developed as a two-semester special seminar that provides the weekly focus for the Food Marketing Fellows Program. The seminar will cover advanced topics in food marketing, many of which will have an important international dimension and will be presented by industry members. A number of field trips will be taken, including an international trip during January intersession and a five-day trip to the Food Marketing Institute Convention in Chicago during the first week in May. Students will prepare research topics on various aspects of the food industry.

ARME 449 Global Marketing Strategy
Fall. 2 credits. Prerequisite: ARME 342. Lecs. W 2:30-4. E. W. McLaughlin.

This course will examine the marketing environment, opportunities, and challenges in the rapidly changing global marketplace. We will explore what factors are predictive of business success in various national environments and the means by which these factors can be incorporated into firm strategy. The focus of the course will be kept practical and managerial through liberal use of actual case studies and industry guests.

ARME 450 Resource Economics
Fall. 3 credits. Prerequisites: MATH 111 and ECON 313. Lecs. M W F 2:30-3:20. J. M. Conrad.

Dynamic models of renewable, nonrenewable, and environmental resources will be constructed to examine market allocation and optimal resource management.

ARME 464 Economics of Agricultural Development
Spring. 3 credits. Prerequisites: ECON 101-102, or permission of instructor. Lecs. T R 12:20-1:35. Staff.

This course is designed to provide an understanding of the economics of the agricultural sector in low-income countries. In addition, more general issues of economic development beyond the agricultural sector will be covered in order to provide the necessary understanding of rural problems. Among the areas covered are the nature of development and technical change, welfare and income distribution, land reform, food and nutrition policy, food security and food aid, competition with more developed countries and international markets, the effects of U.S. policy on agricultural development, and the role of international institutions. Examples from a wide variety of developing countries will be used to illustrate the basis for economic analysis.

ARME 498 Supervised Teaching Experience
Fall or spring. 1-3 credits. Total of 4 credits maximum during undergraduate program. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.

Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty. Students are expected to actually teach at least one hour per week for each credit earned. Students cannot receive both pay and credit for the same hours of preparation and teaching.

ARME 499 Undergraduate Research
Fall, spring, or summer. 1-4 credits. Limited to students with grade-point averages of at least 2.7. Prerequisite: written permission of the staff member who will supervise the work and assign the grade. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. Staff.

Permits outstanding undergraduates to carry out independent study of suitable problems under appropriate supervision. Students cannot receive both pay and credit for the same hours of work.

ARME 605 Agricultural Finance and Capital Management
Fall. 3 credits. Prerequisite: ARME 405 or equivalent. Offered alternate years. Not offered fall 1995 and fall 1997; next offered fall 1996. $25 charge for reading materials; no text. T R 8:40-9:55. E. L. LaDue and L. W. Tauer.

Advanced topics in capital management and financing of agriculture. Special emphasis on current issues. Example topics: farm-sector funds flows, financial risk and decision analysis, agricultural finance policy, financial intermediation and intermediaries, firm growth, inflation, loan evaluation, and selected topics on financing agriculture in developing countries.

ARME 608 Production Economics
Fall. 3 credits. Recommended: ECON 313 and MATH 111 or equivalents. Lecs; M W F 10:10-11. L. W. Tauer.

The theory of production economics with emphasis on applications to agriculture. Topics include the derivation, estimation, and use of production, cost, profit, demand, and supply functions. Production response over time and under risk is introduced.
The first half of the course surveys the theory of welfare economics as a foundation for public policy analysis. Major issues addressed include the problem of social welfare measurement, the choice of welfare criteria, and the choice of market or nonmarket allocation. Basic concepts covered include measurement of welfare change, including the compensation principle, consumer and producer surplus, willingness-to-pay measures, externalities, and the general theory of second-best optimas. The second half of the course focuses on public policy analysis as applied to domestic agricultural policy and international trade. The domestic policy component examines major U.S. farm commodity programs and related food and macroeconomic policies and analyzes their effects on producers, consumers, and other groups. The international trade component examines the structure of world agricultural trade, analytical concepts of trade policy analysis, and the principal trade policies employed by countries in international markets.

ARME 640 Analysis of Agricultural Markets
Fall, weeks 8-14. 2 credits. Prerequisites: ARME 411 and 415 or equivalents. Lecs, T R 2:30-4:25. W. G. Tomek.
This course is about markets for agricultural products. Focus is placed on identifying their distinguishing characteristics, establishing criteria for evaluating performance, analyzing models for price determination, and evaluating selected public-policy issues related to market performance.

ARME 641 Commodity Futures Markets
Fall, weeks 8-14. 2 credits. Prerequisites: ARME 411 and 415 or equivalents. Recommended: ARME 640. Lecs, T R 2:30-4:25. W. G. Tomek.
This course is primarily about markets for agricultural futures contracts. Emphasis is placed on price behavior on cash and futures markets and the relationships among prices. These principles provide a foundation for a discussion of hedging, speculation, and public-policy issues.

ARME 652 Land Economics Problems
Fall or spring. 1 or more credits. Limited to graduate students. Prerequisite: permission of instructor. S-U grades optional. Hours to be arranged. D. J. Allee.
Special work on any subject in the field of land economics.

ARME 660 The World's Food
Designed to introduce first-year graduate students to food economics, the world food situation, and the linkages between food, population, and employment in developing countries. Among the topics considered are the extent of hunger, income and dietary change, control of population growth, and the outlook for feeding an eventual population of 10-12 billion.

AG EC 665 Food and Nutrition Policy (also Nutritional Sciences 685)
Spring. 3 credits. Prerequisites: Introduction to microeconomics and intermediate statistics (i.e. through multiple regression), or permission of instructor. S-U grades optional. Lecs, M W 2:30-3:40. D. Sahn and P. Dorosh.

ARME 694 Graduate Special Topics in Agricultural, Resource, and Managerial Economics
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department.

ARME 698 Supervised Graduate Teaching Experience
Fall or spring. 1-3 credits. Total of 4 credits maximum during graduate program. Students must register with an Independent Study form (available in 140 Roberts Hall). Open only to graduate students. Undergraduates should enroll in ARME 498. S-U grades optional. Prerequisite: permission of instructor. Staff.
This course is designed to give graduate students teaching experience through involvement in planning and teaching courses under the supervision of departmental faculty members. The experience may include leading discussion sections, preparing, assisting in, or teaching laboratories and laboratories, and tutoring. Students are expected to actually teach at least one hour per week for each credit awarded. Students cannot receive both pay and credit for the same hours of preparation and teaching.

ARME 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. Staff.

ARME 700 Individual Study in Agricultural, Resource, and Managerial Economics
Fall or spring. Limited to graduate students. 2 graduation credits. Credit, class hours, and other details arranged with a faculty member. Staff.
This course is used for special projects designed by faculty members. More than one topic may be given each semester in different sections. The student must register in the section appropriate to the topic being covered; the section number is provided by the instructor.

ARME 708 Advanced Production Economics
Fall. 3 credits. Prerequisite: ARME 608, 710, or equivalents; ECON 509 is highly recommended. Offered alternate years. Offered fall 1995 and 1997. Not offered fall 1996. Hours to be arranged. R. N. Bennett.
Theoretical and mathematical developments in production economics, with emphasis on estimating production relationships, scale economies, technical change, factor substitution, and development in flexible functional forms, duality and dynamic adjustment models are emphasized. Discussions of other topics (risk, supply response, and household production functions) based on student interests.

ARME 710 Econometrics I
Spring. 4 credits. Prerequisite: matrix algebra and statistics at the level of BTRY 417 and 601 (BTRY 408-409 preferred). Undergraduates must have permission of instructor. Lecs, T R 2:30-4:25. W. G. Tomek.
This intermediate-level course covers linear statistical models and associated estimators used in econometrics. Topics include dynamic and other stochastic regression models, seemingly unrelated regression and simultaneous equation models, nonstandard error terms, and specification errors and misspecification tests. Students seeking an introduction to econometrics should take ARME 411.

ARME 711 Econometrics II
Fall. 4 credits. Prerequisite: ARME 710 or equivalent. BTRY 417 recommended. Lecs, T R 10:10-12:05. T. D. Mount.
Course covers beyond that of ARME 710 of linear regression models, including alternative methods of incorporating non-sample information and testing restrictions, diagnostic techniques for collinearity and influential observations, pooling data, stochastic coefficients, limited dependent variables and latent variables.

ARME 712 Quantitative Methods I
Fall. 4 credits. Prerequisite: some formal training in matrix algebra. A course at the level of BTRY 417 is highly recommended. Lecs, M W 8-9:50. R. M. Barsky.
A comprehensive treatment of linear programming and its extensions, including postoptimality analysis. Topics in nonlinear programming, including separable, spatial equilibrium, and risk programming models. Input-output models and their role in social accounting matrices and computable general equilibrium models are discussed. Applications are made to agricultural, resource, and regional economic problems.

ARME 713 Quantitative Methods II
This course is concerned with the analysis and optimization of dynamic systems. Course objectives are to (1) present the basic theory of dynamical systems and dynamic optimization, (2) introduce associated methods of numerical and econometric analysis, (3) review some applications of dynamic analysis from various subfields in economics, and thereby (4) equip students with basic theory and methods to perform applied research on dynamic allocation problems.

ARME 717 Research Methods in Agricultural Economics
Spring. 2 credits. Limited to graduate students. Hours to be announced. Staff.
Discussion of the research process and scientific method as applied in agricultural economics. Topics include problem identification, hypotheses, sources of data, sampling concepts and designs, methods of collecting data, questionnaire design and testing, field organization, and analysis of data. During the semester each student develops a research proposal that may be associated with his or her thesis.

ARME 730 Seminar on Agricultural Trade Policy
This course examines selected topics in the professional literature on agricultural trade policy and related topics, including trade liberalization, trade and environmental linkages, technological change and trade policy, and agricultural trade and development.
AG EC 731 Seminar on Agricultural Policy
Fall. 3 credits. Limited to graduate students. Offered alternate years. Offered fall 1995 and 1997; fall 1996.
A review of the professional literature relating to agricultural policy issues and techniques appropriate to the analysis of such issues.

ARME 740 Agricultural Markets and Public Policy
Spring, weeks 1-7. 2 credits. Limited to graduate students. Prerequisite: familiarity with multiple regression techniques at the ARME 411 level or higher. Recommended: ARME 640. T R 12:20-2:15. W. H. Lesser.
Deals with the concepts and methodology for applying and analyzing the effects of public-policy directives to the improvement of performance in the U.S. food marketing system. Prospective topics include a survey of international organization principles, antitrust and other legal controls, and coordination systems in agriculture. Topics can be adjusted to students' interests.

ARME 741 Space, Trade, and Commodity Analysis
Principal topics are spatial micro-economics of the firm, spatial pricing and location decisions, the forms of spatial competition, and quantitative analysis of spatial analyses, which include techniques for finding spatial equilibria and selected network optimization algorithms.

ARME 750 Resource Economics
Spring. 4 credits. Prerequisites: ECON 509 and 518, or ARME 713. Lecs, T R 2:30-4:20. J. M. Conrad.
Optimal control and other methods of dynamic optimization will be used to study the allocation and management of natural resources.

ARME 751 Environmental Economics
Fall. 4 credits. Prerequisites: ECON 509 and 518, or ARME 713. S-U grades optional. Lecs, T R 2:30-4:20. J. M. Conrad.
Economic theory will be applied to the problems of managing environmental quality. Static and dynamic models of externality, decisions to preserve or develop natural environments, and methods of valuation will be presented.

ARME 754 Sociotechnical Aspects of Watershed Development (also Agricultural and Biological Engineering 754, and Government 644)
Spring. 2 or 3 credits. S-U grades optional. W 7:30-9:30 p.m. T. Steenhuis, M. Walter, N. Uphoff, and staff.
Examines watershed development and its relation to agriculture, irrigation and other human activities within its boundaries. Emphasis on social, technical and economic processes within watersheds, including political and administrative aspects. Provides an opportunity to examine systematically the interaction of various aspects of watershed management and design in developing countries.

[ARME 763 Macro Policy in Developing Countries
Spring. 3 credits. Prerequisites: ECON 509, 510, 515 (may be taken concurrently), or permission of instructor. Offered alternate years. Not offered spring 1996 and 1998; next offered spring 1997. Lecs, W 2-4:25. S. C. Kyle.
This course examines the macroeconomic policies in developing countries and their interaction with economic growth, development, and stability. Theoretical models useful for analysis of macro policies will be covered as well as an examination of empirical studies. Emphasis will be on research topics of current interest to students and professionals in the field, particularly those relating to the interaction of macro policy with micro and sectoral analysis.]

ANIMAL SCIENCE

AN SC 100 Domestic Animal Biology I
An introduction to the science of raising animals in the context of commercial animal production. Lectures and labs address the biology of economically important species (morphology, anatomy, and physiology) and application of the biology to the management of animals within major livestock industries. Topics covered include fundamentals of anatomy, regulatory mechanisms, vital systems, digestion, and metabolism. Students care for small numbers of cattle, sheep, pigs, and chickens in different phases of their life cycle to maximize hands-on contact. Living animals will be used noninvasively, and fresh organs and tissues from dead animals will be used in laboratories.

AN SC 105 Contemporary Perspectives of Animal Science
Spring. 1 credit. Limited to freshmen, sophomores, and first-year transfers. T 1:25 or W 12:20. R. C. Gorewit.
A forum to discuss the students' career planning and the contemporary and future role of animals in relation to human needs.

AN SC 150 Domestic Animal Biology II
Spring. 4 credits. S-U grades optional. Lecs, M W F 9:05; lab/disc T W or R 2-4:25. W. R. Butler and staff.
Second of a two-semester sequence (100/150) applying the basic biology of growth, defense mechanisms, reproduction, and lactation to aspects of the production and care of domestic animals. Fresh tissues and organs from dead animals along with preserved specimens will be used in laboratories, exercises, and demonstrations.

AN SC 212 Animal Nutrition
Fall. 4 credits. Prerequisite: CHEM 104 or 208. Recommended: AN SC 100 and 150. Lecs, M W F 10:10; lab, M T W R or F 12:25-2:25. A. W. Bell.
An introduction to animal nutrition, including digestive physiology and metabolism of livestock and other species; nutrient properties and requirements for different aspects of animal production; principles of feed evaluation and ration formulation. Laboratory classes include gastrointestinal tract dissections and a nutritional experiment performed on a laboratory or farm animal species.

AN SC 213 Nutrition of Companion Animals
Spring, weeks 1-7. 1 credit. Prerequisite: AN SC 212 or equivalent. Offered alternate years. Next offered spring 1997. Lecs W 7:30-9:25 p.m. H. F. Hinz.
Nurtion of companions, animals, with emphasis on the dog and cat. Digestive physiology, nutrition, feeding practices, and interactions of nutrition and disease.

AN SC 214 Nutrition of Exotic Animals
Principles of nutrition for exotic animals including birds and fish. Nutrient requirements, sources of nutrients, feeding management systems, and ration formulation will be discussed. Signs of nutrient deficiencies and excesses will be described.

AN SC 215 Exotic Avian Husbandry and Propagation
Spring. 2 credits. Limited to 100 students. Prerequisites: AN SC 100, 150 or Bio G 103, 104 or equivalent. Lec, M 2:30-4:30. J. Parks and D. Muscarella.
Natural history, care, management, health and breeding of exotic avian species with emphasis on psitticines (parrots and related species) and raptors (birds of prey). Lectures, demonstrations, and local field trips.

AN SC 221 Introductory Animal Genetics
Spring. 3 credits. Prerequisite: a year of college biology. Lecs, M W F 9:05; sec, T W R or F 2-4:25. E. J. Pollak.
An examination of basic genetic principles and their application to the improvement of domestic animals, with emphasis on the effects of selection on animal populations.

AN SC 230 Poultry Biology
A course designed to acquaint the student with principles of avian biology and their application in the various aspects of poultry production. Some laboratory sessions involve dissection and/or the handling of live birds.

AN SC 250 Dairy Cattle
Fall. 3 credits. S-U grades optional. Lecs, M W F 10:10; lab, T R 12:25-4:25. A. W. Bell.
A course examining the background and scientific principles relating to dairy cattle production. Laboratories are designed to provide an understanding of production techniques. This course is a prerequisite for AN SC 351.
AN SC 251 Dairy Cattle Selection  
Spring. 2 credits. Prerequisite: AN SC 250 or equivalent. Lab, W 12:20–4:25. D. M. Galton.  
Emphasis on economical and type traits to be used in the selection and evaluation of dairy cattle, including breeding programs that lead to greater genetic progress and herd profitability. Practical sessions include planned trips to dairy herds.

AN SC 265 Horses  
Spring. 3 credits. Prerequisites: AN SC 100 and 150 or permission of instructor. S-U grades optional. Lecs, T R 10:10; lab, R 1:25–4:25. C. Collyer.  
Selection, management, feeding, breeding, and training of light horses.

AN SC 290 Meat Science  
Fall. 2 or 3 credits. Lecs, T R 11:15; lab, M or R 12:20–3:20. D. H. Beermann and staff. Lecture only, 2 credits; lecture plus lab, 3 credits.  
An introduction to meat science through a study of the structure, composition, and function of muscle and its conversion to meat. Properties of fresh and processed meat, microbiology, preservation, nutritive value, inspection, and sanitation are also studied. Laboratory exercises include anatomy, meat-animal slaughter, meat cutting, wholesale and retail cut identification, inspection, grading, curing, sausage manufacture and quality control. An all-day field trip to commercial meat plants is taken.

AN SC 300 Animal Reproduction and Development  
Spring. 3 credits. Prerequisite: AN SC 100–150 or equivalent and one year of introductory biology. Lecs, M W F 10:10. J. E. Parks.  
Comparative anatomy and physiology of mammalian and avian reproduction, with emphasis on domestic and laboratory animals. Fertilization through embryonic development, pregnancy, and growth to sexual maturity, emphasis on physiological mechanisms and application to fertility regulation. Separate laboratory offered to demonstrate fundamental aspects of reproduction and reproductive technology.

AN SC 301 Animal Reproduction and Development Lab  
Spring. 1 credit. Prerequisite: AN SC 100–150 or equivalent. Concurrent enrollment in or completion of AN SC 300 required to register. Labs, M or W or F 1:25–4:25. Each lab limited to 30 students. J. E. Parks.  
Demonstration of fundamental principles and applied aspects of mammalian and avian reproduction. A limited number of live animals will be used for demonstrations. Dissection and examination of tissues from vertebrate animals will be included in selected laboratories.

AN SC 305 Farm Animal Behavior (also BIOP 312)  
Spring. 2 credits. Prerequisites: introductory courses in animal physiology; at least one animal production course or equivalent experience is recommended. S-U grades optional. Lec, T R 11:15. E. A. Olenacu and K. A. Houp.  
The behavior of production species (avian and mammalian) influences the success of any management program. Students study behaviors relating to feeding, reproduction, and social interactions of domestic animals and their physiological basis. Management systems for commercial livestock production and their implications for animal behavior and welfare are stressed.

AN SC 312 Applied Cattle Nutrition  
Spring. 4 credits. Prerequisites: AN SC 100 and 212 (or equivalent). Lecs, M W F 10:10; lab, M 1:25–4:25, T 9:05–12. D. G. Fox.  
An applied approach to predicting nutrient requirements and feed utilization to meet requirements with wide variations in cattle type, feed composition, and environmental conditions. Dairy cattle are emphasized. Nutrient management to minimize cost of production and environmental effects is discussed. Computer models are used in the laboratory to apply the information presented in lectures, including evaluation of feeding programs on case study farms.

AN SC 321 Applied Animal Genetics–Lecture  
Spring. 1 credit. Prerequisite: AN SC 221 or equivalent. Lec, M 9:05. P. A. Olenacu and E. J. Poliak.  
Topics of interest related to the genetic definition and control of qualitative and quantitative traits in various species of animals are presented. Current animal improvement strategies as well as challenges presented by new developments in reproductive biology and molecular genetics are addressed in a lecture discussion-type format.

AN SC 322 Applied Animal Genetics–Laboratory  
Spring. 1 credit. Prerequisite: concurrent registration in AN SC 321 or instructor’s permission. M 2–4:25. P. A. Olenacu and E. J. Poliak.  
Many genetic concepts addressed in AN SC 321 are explored in depth using a computer-assisted instruction environment. Mendelian inheritance of qualitative traits, detection of carriers of recessive genes, artificial selection, inbreeding and heterosis, design and evaluation of genetic improvement and conservation programs, and role of population size are among the topics considered.

AN SC 330 Commercial Poultry Production  
Spring. 3 credits. Prerequisite: AN SC 100 or equivalent. Lecs, T R 9:05; sec, W 1:25–4:25 every other week. D. E. Hogue.  
Nutrient management to minimize cost of production, nutrition, and selection in beef cattle enterprises. A cattle growth model is studied. Laboratories acquaint students with the management skills through computerized simulations and working directly with cattle. Students are required to spend several days during the semester feeding, caring for cattle and observing calving.

AN SC 331 Dairy Herd Management  
Spring. 4 credits. Prerequisites: AN SC 250 or permission of instructor. Recommended: ARME 302. Lecs, M W F 11:15; labs, M or T 1:25–4:25, and F (alternate weeks) 1:25–4:25. D. M. Galton and staff.  
Application of scientific principles to practical herd management with components of reproduction, milking, housing, records, and production economics. Laboratories emphasize practical applications, analyses of alternatives, decision making, field trips, and discussion.

AN SC 360 Beef Cattle  
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 through computerized simulations and working directly with cattle. Students are required to spend several days during the semester feeding, caring for cattle and observing calving.

AN SC 370 Swine Nutrition and Management  
This course will focus on swine nutrition, feeding, and general management. Digestive and metabolic development, interaction of pigs, people, and environment, and current swine nutrition and biotechnology research will also be covered. Laboratory practice, animal project, and problem troubleshooting will be offered.

AN SC 380 Sheep  
The breeding, feeding, management, and selection of sheep from a production-system approach. Lectures and laboratories are designed to give students a practical knowledge of sheep production as well as the scientific background for improved practices.

AN SC 392 Animal Growth Biology  
Fall. 2 credits. Not open to freshmen, sophomores by permission of instructor only. Prerequisites: one year of college biology and one course in animal or human physiology, AN SC 212 and 221. Lec, R 1:25–3:20, sec, F 1:25–2:15. D. H. Beermann and staff.  
A detailed discussion of the morphological and physiological aspects of growth of domestic and laboratory animals. Overview of the cell cycle and early embryo growth regulation, differentiation and cellular aspects of tissue development and growth, maternal influences on fetal growth and allometric patterns of postnatal growth are discussed. Endocrine, genetic and nutritional influences on protein and lipid metabolism, nutrient requirements and composition of growth will be emphasized.
Each student will write a book review to be handed in mid-semester. One afternoon field trip is planned.

AN SC 445 Poultry Nutrition
Spring. 1 credit. Prerequisite: AN SC 410 or permission of instructor. Lec., F 11:15. R. E. Austic and K. Keshavarz.
A practical consideration of principles of nutrition applied to feeding poultry, including use of linear programming techniques in diet formulation.

AN SC 420 Quantitative Animal Genetics
Fall. 2 credits. Prerequisite: AN SC 221 or equivalent. Limited to 30 students. Lec., T 11:15, sec., R 2-4:25. E. J. Pollak.
A consideration of problems involved in improvement of animals through application of the theory of quantitative genetics, with emphasis on genetic evaluation and analysis of data for genetic parameters.

AN SC 425 Gamete Physiology and Fertilization
Fall. 2 credits. Limited to 50 students. Prerequisite: AN SC 300 or equivalent. Offered alternate fall 1995, 1997. Lecs., R. 2:30-4:25. J. E. Parks.
Study of the formation, growth, differentiation, and maturation of mammalian sperm and oocytes; gamete transport and interaction with male and female reproductive tracts; and cytological, physiological, and molecular changes required for fertilization. Lecture, discussion, and demonstration of selected aspects of gamete physiology and in vitro technologies such as oocyte maturation and fertilization.

AN SC 457 Livestock Fellowship
Spring. 2 credits. Prerequisite: Animal husbandry, or permission of instructor. S-U grades only. Lec., T 9:05-11:00. D. E. Hogue.
A program for students with particular interests in meat animal production, beef cattle, sheep, and swine. Objectives are to gain a more thorough understanding of the production of these species and their integration in various farm management situations. Students will participate in extension education programs and have contact with representative livestock producers as well as the agribusiness organizations important to livestock production.

AN SC 490 Commercial Meat Processing
Spring. 2 or 3 credits. Prerequisite: AN SC 290 or permission of instructor. Offered alternate years. Offered spring 1996, 1998. Lecs., T 9:05; Lab., T 1:25-4:25. Lecture only, 2 credits; lecture and lab, 3 credits. Field trip to commercial meat processing plants. D. H. Beermann.
A study of the classification, formulation, and production of commercially available processed meat products. Physical and chemical characteristics of meat and nonmeat ingredients; their functional properties; various processing methodologies; microbiology; packaging, handling, and storage; and quality assurance are discussed.

AN SC 494 Special Topics in Animal Science
Fall or spring. 4 credits maximum. Prerequisite: undergraduate standing. S-U grades optional. Staff.
The department teaches "trial" courses under this number. Offerings vary by semester and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

AN SC 496 Animal Sciences Honors Seminar
Fall. 2 credits. Prerequisite: permission of instructor. S-U grades optional. Staff.
The course is designed to provide information and guidance for students enrolled in the honors program in animal sciences and expecting to complete an honors thesis. The following topics will be presented and discussed: requirements and expectations of the honors program, formulating hypotheses, the scientific method, literature searches, technical ethics in science, and scientific communication. Students are required to make oral presentations.

AN SC 497 Individual Study in Animal Science
Fall or spring. 1-3 credits; may be repeated for credit. Intended for students in animal sciences. Prerequisite: permission of instructor. Staff. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. Staff.
May include individual tutorial study or a lecture topic selected by a professor. Since topics may change, the course may be repeated for credit.
AN SC 498 Undergraduate Teaching
Fall or spring. 1, 2 or 3 credits; limited to two experiences during undergraduate career. Limited to students with grade-point averages of at least 2.7. Students must register with an Independent Study form (available in 140 Roberts Hall). Designed to consolidate the student's knowledge. A participating student assists in teaching a course allied with the student's education and experience. The student is expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

AN SC 499 Undergraduate Research
Fall or spring. 6 credits maximum during undergraduate career. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Limited to juniors and seniors with grade-point averages of at least 2.7. Students must register with an Independent Study form (available in 140 Roberts Hall).

An independent research setting. Opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.

AN SC 601 Amino Acids (also NS 601)

A course emphasizing the dynamic aspects of protein digestion and absorption, amino acid transport and amino acid and nitrogen metabolism, and their relationships to the requirements for amino acids.

AN SC 604 Vitamins
Fall. 2 credits. Lect, T R 10:10. G. F. Combs, Jr.
The biochemical, physiological, and clinical aspects of the vitamins presented in an interactive discussion-based format.

AN SC 605 Forage, Fiber, and the Rumen
Spring. 4 credits. Prerequisites: either general nutrition or biochemistry or permission of instructor. S-U grades optional. Offered alternate years. Not offered spring 1996 and 1998; next offered spring 1997. Lect, W F 12:20; disc, W 11:15 or F 1:25. D. J. Van Soest. Ruminant nutrition; lower-tract fermentation in monogastrics; nutritional biochemistry of forage plants, fiber, and cellulose material.

AN SC 606 Ruminant Nutrition: Microbial Ecology and Forage Chemistry
Spring. 4 credits. Prerequisites: General nutrition or biochemistry or permission of instructor. May not be taken after AN SC 605. S-U grades optional. Lect, M W F 12:20; disc, W 11:15 or F 1:25. A. N. Pell. Ruminant nutrition, microbial ecology, fiber digestion, forage chemistry, and rumin function.

AN SC 610 Seminar
Fall and spring. 1 credit. S-U grades only.

AN SC 613 Forage Analysis

AN SC 619 Field of Nutrition Seminar
Fall and spring. No credit. No grades given. Lectures on current research in nutrition.

AN SC 620 Seminar in Animal Breeding
Fall and spring. 1 credit. Limited to graduate students with a minor or major in animal breeding. S-U grades only. Hours to be arranged.

AN SC 621 Seminar: Endo/Reprod Biology
Fall and spring. 1 credit. Prerequisites: Permission of instructor. Registration limited to graduate students. S-U grades only. Lect, W 4:00. W. R. Butler and staff. Current research in reproductive physiology is presented by staff, graduate students, and visitors.

[AN SC 630 Bioenergetics/Nutritional Physiology
Spring. 3 credits. Prerequisites: AN SC 410 and biochemistry or physiology, or permission of instructor. S-U grades optional. Offered alternate years. Next offered spring 1997. Lect, M W F 10:10. A. W. Bell and D. E. Bauman. An integrated systems approach to the nutritional physiology and energy metabolism of productive animals. Emphasis on extracellular regulation of tissue and organ metabolism of specific nutrients in relation to pregnancy, lactation, and growth. Critical discussion of techniques and approaches to the study of animal bioenergetics.]

AN SC 640 Individual Study in Animal Science
Fall or spring. 1 or more credits. S-U grades optional. Hours to be arranged. Staff. Study of topics in animal science more advanced than, or different from, other courses. Subject matter depends on interests of students and availability of staff.

AN SC 649 Special Topics in Animal Science
Fall or spring. 4 credits maximum. Prerequisite: graduate standing. S-U grades optional. The department prescribes "trial" courses under this number. Offerings vary by semester and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

AN SC 720 Advanced Quantitative Genetics

AN SC 800 Master's-Level Thesis Research
Fall or spring. Credit to be arranged. Prerequisite: permission of adviser. S-U grades optional. Graduate faculty. For students admitted specifically to a Master's program.

AN SC 900 Graduate-Level Thesis Research
Fall or spring. Credit to be arranged. Prerequisite: permission of adviser. S-U grades optional. Graduate faculty. For students in a Ph.D. program only before the 'A' exam has been passed.

Related Courses in Other Departments
Introductory Animal Physiology (BIOAP 311) Introductory Animal Physiology Laboratory (BIOAP 319) Milk Quality (FOOD 351) Agriculture in the Developing Nations (INTAG 602) Lipids (NS 602) Basic Immunology, Lectures (BIOBM 305) Basic Immunology, Laboratory (BIOBM 307)

BIOMEDICAL SCIENCES
The program of study in biology is offered by the Division of Biological Sciences. For course descriptions, see the section on the Division of Biological Sciences.

BIOMETRY AND STATISTICS
Courses in biometry and statistics are offered by the Biometrics Unit in the Department of Plant Breeding and Biometry.

BTRY 102 Introduction to Biometry
Fall. 3 credits. S-U grades optional. Prerequisites: ALS 115 or equivalent. An introductory survey course in the use of mathematics, computing, and probability and statistics in the biological sciences. Case studies are used to develop the ideas of statistics, curve fitting, elementary matrix algebra, basic probability, and differentiation. Selected topics in differential and difference equations and integration will also be covered. A symbolic mathematics and graphics package (e.g., Maple or Mathematica) will be taught and used throughout the course.

BTRY 200 Statistics and the World We Live In
Spring. 3 credits. Major concepts and approaches of statistics are presented at an introductory level. Three broad areas are covered: collecting data,
organizing data, and drawing conclusions from data. Topics include sampling, statistical experimentation and design, measurement, tables, graphs, measures of center and spread, probability, the normal curve, confidence intervals, and statistical tests.

BTRY 215 Introduction to Statistical Methods
Fall. 3 credits. Prerequisite: BTRY 200 is recommended for students with no prior experience in data collection and interpretation. Statistical methods are developed and used to analyze data arising from the biological sciences. Topics include point and confidence interval estimation, hypothesis testing, t-tests, correlation, simple linear regression, and analysis of variance and multiple regression. Statistical computing is taught and used throughout the course. Emphasis is on proper use of statistical methodology and interpretation of statistical analyses.

BTRY 408 Theory of Probability
Fall. 4 credits. Prerequisite: MATH 112, 122, or 192, or permission of instructor. An introduction to probability theory: foundations, combinatorics, random variables and their probability distributions, expectations, generating functions, and limit theory. Biological and statistical applications are the focus. Can serve as a one-semester introduction to probability or a foundation for a course in the theory of statistics.

BTRY 409 Theory of Statistics
Spring. 4 credits. Prerequisite: BTRY 408 or equivalent. The concepts developed in BTRY 408 are applied to provide an introduction to the classical theory of parametric statistical inference. Topics include sampling distributions, parameter estimation, hypothesis testing, and linear regression. Students seeking applied courses in statistical methodology should consider BTRY 601-602 or BTRY 215.

BTRY 417 Matrix Algebra
Fall. 3 credits. Prerequisite: precalculus mathematics. Definitions, basic operations and arithmetic, determinants, and the inverse matrix. Rank, linear dependence, canonical forms, linear equations, generalized inverses and eigenroots and vectors. Emphasis on understanding basic ideas and on developing skills for applying matrix algebra.

BTRY 451 Mathematical Modeling of Populations
Fall. 3 credits. Prerequisite: MATH 111 and 112, or equivalent. Offered alternate years. Not offered 1995-96. This course concentrates in the analysis and simulation of mathematical models, and it will focus in the study of models relevant to population genetics and population biology. Mathematical techniques that are relevant to these areas will be presented. The course will emphasize stochastic and deterministic models. Computer simulations and the use of mathematical packages will be an integral part of this course.

BTRY 495 Statistical Consulting
Spring. 2 credits. S-U grades only. Limited to undergraduates. Prerequisites or co-requisites: BTRY 409 and 602 and permission of instructor. Participation in the Biometrics Unit consulting service: faculty-supervised statistical consulting with researchers from other disciplines. Discussion sessions for joint consideration of selected consultations encountered during previous weeks.

BTRY 497 Undergraduate Individual Study in Biometry and Statistics
Fall or spring. 1-3 credits. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall). Consists of individual tutorial study selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

BTRY 498 Undergraduate Supervised Teaching
Fall or spring. 2 credits. S-U grades only. Students must register with an Independent Study form (available in 140 Roberts Hall). Students assist in teaching a course appropriate to their previous training. Students will meet with a discussion or laboratory section and regularly discuss objectives with the course instructor.

BTRY 499 Undergraduate Research
Fall or spring. 1-3 credits. S-U grades only. Limited to statistics and biometry undergraduates. Prerequisite: permission of faculty member directing research. Students must register with an Independent Study form (available in 140 Roberts Hall).

BTRY 600 Statistics Seminar
Fall or spring. 1 credit. S-U grades only.

BTRY 601 Statistical Methods I
Fall and summer. 4 credits. Limited to graduate students; others by permission of the instructor. Statistical methods are developed and used to analyze data arising from a wide variety of applications. Topics include descriptive statistics, point and interval estimation, hypothesis testing, inference for a single population, comparisons between two populations, one- and two-way analysis of variance, comparisons among population means, analysis of categorical data, and correlation and regression analysis. Interactive computing is introduced through MINITAB statistical software. Emphasis is on basic principles and criteria for selection of statistical techniques.

BTRY 602 Statistical Methods II
Spring. 4 credits. Limited to graduate students; others by permission of instructor. Prerequisite: BTRY 601 or equivalent. A continuation of BTRY 601. Emphasis is on the use of multiple regression analysis, analysis of variance, and related techniques to analyze data in a variety of situations. Topics include an introduction to data collection techniques; least squares estimation; multiple regression; model selection techniques; detection of influential points, goodness-of-fit criteria; principles of experimental design; analysis of variance for a number of designs, including multi-way factorial, nested, and split plot designs; comparing two or more regression lines; and analysis of covariance. Emphasis is on appropriate design of studies prior to data collection, and the appropriate application and interpretation of statistical techniques. For practical applications, computing is done with the MINITAB and SAS statistical packages.

BTRY 603 Statistical Methods III
Fall or spring. 3 credits. Prerequisite: BTRY 601 and 602 or permission of instructor. Offered alternate years. Not offered 1995-96; next offered Spring 1997. Categorical data analysis, including logistic regression, loglinear models, combining contingency tables, and applications to case control studies. Statistical aspects of survival analysis, and statistical analyses for clinical trials.

BTRY 604 Statistical Methods IV: Applied Design
Fall or spring. 3 credits. Prerequisites: BTRY 601 and 602 or permission of instructor. Offered alternate years. Not offered 1996-97; next offered fall 1995. Applications of experimental design including such advanced designs as split plots, incomplete blocks, fractional factorials. Use of the computer for both design and analysis will be stressed, with emphasis on solutions of real data problems.

BTRY 605 Applied Regression Analysis
Fall. 1/3 of the term. 1 credit. Prerequisites: BTRY 409 and 602. Offered alternate years. Not offered 1995-96. A continuation of BTRY 602, with emphasis on data analysis including logistic and nonlinear regression.

BTRY 606 Sampling Biological Populations
Fall, 1/3 of the term. 1 credit. Prerequisite: BTRY 601 or equivalent. Offered alternate years. Not offered 1995-96. Standard methods of sample-survey design and estimation are presented, including stratified random sampling, cluster sampling, double sampling, and sample size estimation. Special emphasis given to methods of particular utility or specifically designed for biological sampling. Examples are taken from agriculture, forestry, fisheries, and other biological areas.

BTRY 607 Nonparametric and Distribution-Free Statistical Methods
Fall. 1/3 of the term. 1 credit. S-U grades only. Permission of instructor. A statistical approach to normal-theory testing procedures are presented: sign or rank tests for one or two populations; analyses for completely randomized and randomized blocks designs; comparisons among several means; correlation and regression; goodness-of-fit, and tests based on randomization of the data.

BTRY 639 Epidemiology Seminar
Fall and spring. 1 credit, variable. S-U grades only. Permission of instructor. Staff. This course will develop skills in the preparation and interpretation of epidemiological data by discussing current research topics and issues.
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BTRY 642 Advanced Mathematical Methods in Biometry and Statistics
Spring. 3 credits. S-U grades optional. Prerequisites: MATH 411 or 421, or equivalent. Offered alternate years. Not offered 1995–96.
This advanced level course will cover classical mathematical methods that are useful in statistics, biometry, and biomathematics, with an introduction to MACSYMA. Topics include: Introduction to MACSYMA, complex numbers and their elementary properties, analytic functions, contour integration, special functions, asymptotic methods, generalized functions, and the Fourier transform. Techniques will be illustrated with examples drawn from statistics, biometry, and biomathematics.

BTRY 651 Mathematical Population Studies and Modeling
Spring. 3 credits. S-U grades optional. Prerequisites: BTRY 408 and 417, or equivalent. BTRY 409 is recommended. Offered alternate years. Not offered 1995–96.
Model formulation, parameter estimation, and mathematical analysis of stochastic and deterministic models in population dynamics. Emphasis will be put on the interactions between human demography and sociology (human behavior), and their relationship to disease dynamics of microparasitic and macroparasitic infections. The process of pair formation and dissolution and their impact on demography, sociology, and epidemiology will also be studied.

BTRY 662 Mathematical Ecology
Spring. 3 credits. Prerequisites: a year of calculus and a course in probability. Offered alternate years. Not offered 1995–96.
Mathematical and statistical analysis of populations and communities: theory and methods. Spatial and temporal pattern analysis, deterministic and stochastic models of population dynamics. Model formulation, parameter estimation, and simulation and analytical techniques.

BTRY 672 Topics in Environmental Statistics (also OR&E 672)
Fall and spring. 2 credits. S-U grades optional. Prerequisite: BTRY 601 or permission of the instructor. This course is a discussion group focusing on statistical problems arising in the environmental sciences. These issues are explored in a number of different ways, such as student presentations of research papers, directed readings, and outside speakers.

BTRY 694 Graduate Special Topics in Biometry and Statistics
Fall or spring. 1–3 credits. S-U grades optional. A course of lectures selected by the faculty. Because topics usually change from year to year, this course may be repeated for credit.

BTRY 697 Individual Graduate Study in Biometry and Statistics
Fall, spring, or summer. 1–3 credits. S-U grades optional. Consists of individual tutorial study selected by the faculty. Since topics usually change from year to year, this course may be repeated for credit.

BTRY 717 Linear Models
Spring. 3 credits. S-U grades only. Prerequisites: BTRY 409 or equivalent and BTRY 417 and 602. Offered alternate years. Not offered 1995–96.
Analysis of variance and estimation procedures for unequal-subclass-numbers data. Introduction to least-squares classification, and the 2-way crossed classification, both with and without interactions. Introduction to multilinear variables and the distribution of quadratic forms. The general linear model (in matrix and vector form), estimable functions, and testable hypotheses. Overparameterized models, restricted models, multifactor cases, covariables, computing.

BTRY 718 Variance Components
Spring. 3 credits. S-U grades only. Prerequisite: BTRY 717. Offered alternate years. Not offered 1995–96.
Several methods of estimating variance components are explained and compared: for balanced data (equal subclass numbers), introduction to analysis of variance method; for unbalanced data (unequal subclass numbers), the three Henderson methods and the methods of maximum likelihood, restricted maximum likelihood, and minimum norm quadratic unbiasedness. Also included: estimation from mixed models, prediction of random variables, the dispersion-mean model, and computer package output for variance component estimation.

BTRY 795 Statistical Consulting
Fall and spring. 2 credits. S-U grades only. Limited to graduate students. Lec, W 1:25 and 1 hr. of consulting to be arranged. Staff. Participation in the Biometrics Unit consulting service: faculty supervised statistical consulting with researchers from other disciplines. Discussion sessions for joint consideration of selected consultations encountered by the services during previous weeks. Since consultations usually change from semester to semester, the course may be repeated for credit.

BTRY 800 Master's Level Thesis Research
Fall or spring. Credit to be arranged. S-U grades only. Limited to candidates for graduate degrees. Prerequisite: permission of the graduate field member concerned. Research at the M.S. level.

BTRY 900 Graduate Level Dissertation Research
Fall or spring. Credit to be arranged. S-U grades only. Limited to candidates for graduate degrees. Prerequisite: permission of the graduate field member concerned. Research at the Ph.D. level.

BTRY 901 Doctoral Level Dissertation Research
Fall or spring. Credit to be arranged. S-U grades only.

COMMUNICATION

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The middle and last digits of course numbers are used to denote specific areas.

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

Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

COMM 116 Theories of Human Communication

Designed to introduce students to the basic areas of study common in communication theory and research. Basic ideas and theories about language, interpersonal communication, small-group communication, nonverbal communication, organizational communication, and the mass media will be covered.

COMM 120 Understanding Mass Communication

Mass communication and its impact. Emphasis on understanding contemporary mass communication through four approaches: the information revolution; living in the information society; contemporary research and theory; and implications of mass communication in understanding contemporary social issues.

COMM 190 Communication Perspectives Seminar

Open to freshmen/transfer students in the Department of Communication. The course will provide an orientation to the department and university and serve as a forum to discuss contemporary and future roles of communication in society. Presentations by Cornell faculty and staff members and by professionals in the field. Topics will be selected from areas such as new technology, constitutional and policy issues, career opportunities, professionalism and ethics, societal changes and implications.
COMM 191 Topics in Communication  
Summer. 1-3 credits. Hours to be arranged. Staff. Study of topics in communication at lower-division level. Special emphasis on topics reflecting the particular visiting faculty available in summer session and on topics suitable for entry-level college students.

COMM 201 Oral Communication  
Fall, spring, or summer. 3 credits. Each section limited to 20 students (fall and spring) or 15 students (summer). Preference given to sophomores, juniors, and seniors. Plurality in spoken English is assumed. Students missing the first two class meetings without university excuse are dropped so others may register. No student will be added or dropped after the second week of classes. M. Koceszewski, T. Russo, R. Thompson, and Staff. Through theory and practice students develop self-confidence and competence in researching, organizing, and presenting material to audiences. Students give four graded speeches, write short papers, perform speech evaluations, and engage in other speech-related activities.

COMM 203 Argumentation and Debate  
Fall, spring, or summer. 3 credits. T R 10:10-11:55. P. Stepp. The student will learn the principles of argumentation and the rules of debate. Classroom discussions on the CEDA national topic will provide experience in critical thinking, rapid organization of thoughts, employment of research, and writing and speaking in a logical, persuasive manner.

COMM 204 Effective Listening  
Fall, spring, or summer. 3 credits. Limited to 25 nonfreshman students per section. No students accepted or allowed to drop after the second week of classes. Lec, M 1:25-2:40; sec, W 1:25-2:40, 2:55-4:10; R 1:25-2:40; F 1:25-2:40. R. Thompson. Lectures and sections are used to present an analysis of the process of listening, to identify barriers to effective listening, and to develop students' listening skills. Topics include: audiometry, cultural contexts, intercultural communication, pragmatics, therapeutic listening, and critical analysis of information. Students are involved in skill-building exercises and in writing self-analytical papers, as well as attending seminars.

COMM 215 Introduction to Health Communication  
Fall. 3 cr. Not open to freshmen. T 2:30-3:45. A. Marshall. The course provides an overview of health communication, examining topics such as physician-patient relationships, the role of support groups, communication in health care organizations, cultural differences in health beliefs and communication, communicating information to disenfranchised groups and effects of health campaigns. Instruction techniques include class discussion, case studies, and individual group projects.

COMM 216 Communicating Interpersonally  
Fall, spring, or summer. 3 credits. Prerequisite: COMM 110 or permission of instructor. Not open to freshmen. Communication in group and interpersonal relationships are given first priority. Not offered 1995-96. Staff.

The course emphasizes understanding the dynamics affecting interpersonal communication in personal, social, and professional circumstances. It addresses self-awareness, assertiveness, person perception, attraction, and conflict management. Communication techniques include in-class exercises, assigned reading, class discussion and lecture, plus report of field observation and journal-keeping assignments.

COMM 230 Visual Communication  
Fall. 3 credits. Lec, T R 9:05-9:55; lab, R 10:10-12:05, 1:25-3:20; P 10:10-12:05. C. Shockey. An introduction to visual communication theory. Course examines how visual influence our attention, perspectives, and understanding. Examples of visuals drawn from advertising, TV news, documentaries, entertainment movies, print and interactive media are used to develop a theoretical framework for becoming more visually aware and for thinking more critically about how visuals influence us.

COMM 232 Art of Publication  
Fall, spring, or summer. 3 credits. Each lab limited to 15 freshmen students. Students missing the first two classes without university excuse are dropped so others may register. Project materials cost $75-$80 for each class. Lecs M 2:30-4:25; W 2:30-4:25. M. Toor. A basic course designed to explore visual concepts that increase communication effectiveness through the printed word. The importance of selecting and coordinating format, layout, typography, and illustrations is stressed. Lectures, in-class laboratory assignments, and outside projects examine opportunities and problems in publication design and desktop publishing.

COMM 250 Newswriting for Newspapers  
Fall, spring, or summer. 3 credits. Limited to 25 students. Prerequisite: Major in communication or permission of instructor. Keyboarding ability essential. Students missing first two classes without university excuse will be dropped. Lecs, F 9:05-10:55; R 2:30-4:15 or P 10:10-12:05. Staff. Writing and analyzing news stories. A study of the elements that make news, sources of news, interviewing, writing style and structure, press problems, and press-society relations. Concentration on newswriting as it is practiced by newspapers in the United States. Two writing assignments each week, one done in class, one done out of class.

COMM 272 Principles of Public Relations and Advertising  
Fall or summer. 3 credits. Preference given to AAS students. Not open to freshmen. M W F 9:05-9:55. Staff. Survey of the fields of public relations and advertising. Descriptions of organizations, jobs, and functions in the industry. The roles of public relations and advertising in society, the economic system, and organizations. Psychological and sociological principles as bases for appeals. Strategies for media selection and message execution. Introduction to research and regulation.

COMM 273 Communication Institutions  
Spring. 3 credits. Limited enrollment. T R 10:10-11:25. J. Shanahan. A survey of the history, organization, and social importance of communication institutions. Institutions to be analyzed include advertising/PR, media industries, propaganda and political communication, news/journalism, and new technologies. Cases and examples will be drawn from topics relevant to CAS programs, including environment, agricultural policy and land use. Communication 116 or 120 are suggested but not required.

COMM 280 Thinking about Communication  
Fall or spring. 3 credits. Prerequisite: COMM 116, 120, and at least one writing or oral communication course. Communication majors only. Not open to freshmen. Communication sophomores given priority. Fall: Lec 01 T R 10:10-12:05; Lec 02 T R 12:20-2:35. Spring: Lec 01 T R 12:20-1:35. Lec 02 T R 2:30-3:45. Staff. Expanding upon conceptual knowledge gained in introductory communication courses, students will learn critical thinking in the context of communication topics, issues, problems, and questions selected annually by individual instructors. After learning, discussing, and practicing critical thinking, students will have an enhanced ability to create and sustain responsible dialogue, as well as to evaluate implications and applications of thought.

COMM 284 Gender and Communication  
Fall or summer. 3 credits. Not open to freshmen. Lec M 2:30-3:20, disc, T 2:30-3:20. L. Van Buskirk. The course explores the construction of masculine and feminine genders and the personal, social, and structural implications of gender categories. Topics considered include history, social structures, personal relationships, nonverbal and mass communication. Distinctions among ways that the arts, mass media, social and historical forces, and interpersonal relationships communicate gender will be considered.

COMM 301 Business and Professional Speaking  
Fall, spring, or summer. 3 credits. Prerequisite: COMM 201. Limited to second term sophomores, juniors and seniors during fall and spring. Lee, M 11:15-12:05; sec, T 10:10-12:05, W 10:10-12:05, 1:25-3:20; R 2:30-4:25. B. Earle. The study and practice of written and oral communication skills used in formal and informal organizations, including interviews, informative and persuasive speeches, reports, and discussions. Students exercise and enhance the organizational, analytical, and presentional skills needed in particular settings suited to their own business and professional careers.

COMM 303 Advanced Public Address I  
Fall and spring. 2 credits. Limited to 10-15 Program in Speech and Debate members only; permission of instructor and completion of one-year trial basis. Hours to be arranged. P. Stepp. The first course in a year-long sequence. Students prepare and present speeches not covered in introductory courses, including limited preparation events (e.g., extemporaneous speaking, in which one composes and presents a speech on current events within a 30-minute period); rhetorical criticism (students apply analytic tools to extend speeches to reveal their structure and intent); and special events, which typically involve unusual constraints upon the speaking
COMM 304 Oral Interpretation of Literature
Fall or spring. 2 credits. Limited to 10–15 Program in Speech and Debate members only; permission of instructor and completion of one-year trial basis. Hours to be arranged. P. Stepp. Students consider the structures of literary works for their intellectual and emotional content; practice the techniques of composing programs of prose, poetry, or drama for presentation; and develop the skills necessary to realize such programs in live performance. Students prepare a minimum of three different programs for tournaments.

COMM 314 Small-Group Communication
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: COMM 116 or permission of instructor. T R 1:25–2:45. N. Awa. The course is designed to help students explore the dynamics of group interaction processes through exposure to small-group constructs and research and development of skills vital to application of principles to real life situations. The approach is eclectic, covering theories from such cognate fields as psychology, sociology, education, and organizational behavior. Students will learn experientially about groups by participating in group (problem solving) projects. Among the areas covered are the role of groups in contemporary society, leadership, decision making and problem solving techniques, conflict management and resolution, groups in business and industry, and team development.

COMM 316 Rhetorical Theory
Fall. 3 credits. Limited to 20 students. Communication majors have preference. Prerequisites: COMM 116 and 201 or permission of instructor. Not offered 1995–96. R. Thompson. Considers current views of rhetoric in historical perspective. Shows how assumptions about communication both shape the worldview of the communicator and effect the reaching of various communication goals. Treats historical figures briefly; focuses on contemporary thinkers such as Toulmin, Org, Burke, Habermas, Foucault, Perelman, Richards, Kuhn. Second half of course taught in seminar format.

COMM 342 Electronic Media
Spring or summer. 3 credits. Limited to 21 communication majors. Prerequisite: COMM 120. Lec, R 1:25; lab, R 2:30–4:25. T. Russo. The process of audio and video message design and production is explored. Emphasis is on development of skills needed for the creation of effective audio/video production. Students complete exercises designed to develop specific competencies and work on productions from conception through completion.

COMM 348 Video as a Communication Tool
Fall. 3 credits. Prerequisites: permission of instructor. Lec, R 1:25–2:15; lab, R 2:30–4:25. S. White. This course explores video as a non-broadcast communication tool utilizing organizational and visual communication conceptual and theoretical foundations. An overview of video applications, visual thinking, and team building in employing participatory approaches to constructing messages. Covers basics of interactive media and issues of changing communication technologies. Hands-on team project integrates knowledge, theory, and practice. Students have access to camcorders and editing equipment.

COMM 350 Writing for Magazines
Fall or spring. 3 credits. Limited to 25 juniors, seniors, and graduate students, or others with permission of instructor. No drop after third week. Extensive out-of-class writing assignments. Fall: M 1:25–4:25; spring: T R 12:20–1:50. W. Ward and staff. A course in nonfiction freelance writing for magazines. Intensive fact writing to help students communicate more effectively through the medium of the printed word in magazines. Art and techniques of good writing are studied; magazines in many fields of interest are reviewed. All articles are analyzed and returned to the student to rewrite and submit to a magazine.

COMM 352 Science Writing for the Mass Media
Fall. 3 credits. Not open to freshmen. Prerequisite: one college writing course. Lecs, M W 9:05; lab, W 12:20–2:15; 2:30–4:25. B. Lewenstein. How to write about science, technology, and medicine for the mass media. Discussion topics include accuracy, simplicity, comprehensiveness, risk communication, and the history and social structure of science. Writing assignments focus on writing news and feature stories for newspapers and magazines, with excursions into newletters, radio, TV, and other media.

COMM 354 Print Media Laboratory
Fall. 3 credits. Limited to junior, senior, and graduate communication majors. Prerequisite: COMM 232, 250, or 350. No adds or drops after 4th week. R 1:25–4:25. J. E. Hardy and staff. Writing, editing, and layout principles practiced in publishing the Cornell Countryman. Some additional outside work will be required. Students will use microcomputers.

COMM 356 Print Media Laboratory

COMM 357 Advanced Reporting
Fall and spring. 3 credits. Limited to 12 juniors and seniors. Not offered 1995–96. Staff. A course in sophisticated reporting techniques for students with basic reporting and newswriting skills. Students work independently on producing news stories of publishable merit. The emphasis is on information gathering, conducting document searches, document authentication, and identification of experts. Not open to graduate students.

COMM 360 Scientific Writing for Public Information
Fall and spring. 3 credits. Limited to 25 nonfreshman or graduate students per section. Prerequisite: one college-level writing course. Fall: Lec 01 M W F 9:05–9:55; Lec 02 T R 9:05–9:55. For Lec 02 only, sec 01 W 11:15–12:05. Lec 03 T R 10:10–11:00. For Lec 03 only, Sec 02 12:20–1:10. Spring: Lec 01 M W F 9:05–9:55. Lec 02 T R 10:10–11:00. For Lec 02 only, Sec 01, W 12:20–1:10. Staff. An intensive course in employing scientific and technical material for specific audiences within the general public. Weekly assignments include instructions, descriptions, explanations, and summaries in such formats as the newsletter, brochure, and report. Audience analysis will be emphasized. Not oriented to the mass media, or writing for scientists.

COMM 363 Organizational Writing
Fall, spring, or summer. 3 credits. Limited to 25 junior, senior, or graduate students per section. Prerequisite: any college-level writing course. Fall: Lec 01 M W F 11:15; Lec 02 M W F 12:20; Lec 03 M W F 9:05; Lec 04 M W F 2:30. Spring: M W F 11:15; M W F 12:20. L. Van Buskirk and staff. Students write as members of different organizations, in the position of supervisor, subordinate, colleague, and representative of business, government, community, and other organizations. Emphasis on adapting tone to the audience and the situation of the message. Weekly writing assignments include various kinds of internal and external reports, memoranda, proposals, and letters. Assignments based on the Exxon Valdez oil spill and other case studies.

COMM 366 Editing
Spring. 3 credits. Limited to 25 junior, senior, or graduate students. Prerequisite: COMM 250, 350, 352, or 360. W F 10:10–11:25. J. E. Hardy. Students will follow the process that takes a manuscript from final draft to publication. Emphasis will be on copy editing, proofreading, fitting copy, working with authors, making editorial decisions, and developing skill in critical reading. Appropriate for any student who expects to work with manuscripts or do editorial work.

COMM 375 Communication Planning and Strategy I
Spring. 3 credits. Limited to 35 juniors and seniors. Prerequisite: COMM 272 or permission of instructor. T R 10:10–12:05. P. Yarbrough. Theories that guide and influence the solutions to public relations and public information problems in agriculture, business, government, social welfare, and other organizations. Examination of the process of the formation of public opinion. Discussion of research techniques and computerized tools used in communication planning, and fundamentals of developing a communication plan. Case studies and projects.

COMM 376 Communication Planning and Strategy II
Spring. 3 credits. Limited to 25 juniors and seniors. Prerequisite: COMM 375 or permission of instructor. T R 2:30–4:00. A. Marshall. Focus this semester will be on the development and implementation of actual health communication campaigns. Students work closely with a community non-profit organization in designing and implementing a communication program.
COMM 380 Independent Honors Research in Social Science
Fall or spring. 1-6 credits. Limited to undergraduates who have met the requirements for the honors program.
B. Lewenstein.

COMM 382 Methods of Communication Research
Spring. 3 credits. Lec M W 12:20-1:10; labs, W 1:25-3:15, F 1:25-3:15.
D. McDonald and P. Yarbrough.
An analysis of the methods used in communication research on understanding the rationale for survey, textual, experimental, and ethnographic research methods. Development of class research project from research question to final report. Computer use of Statistical Package for the Social Sciences (SPSS) to assist in data analysis. Familiarity with basic statistical concepts helpful. Lectures concurrent with COMM 682 to promote interaction and learning across levels.

COMM 402 Advanced Argumentation and Debate II
Fall and spring. 2 credits. Limited to 10-15 Program in Speech and Debate members; permission of instructor required. Hours to be arranged. P. Stepp.
The second course in a year-long sequence that considers formal argumentation through lectures, readings, and practical exercises including computer-aided case research, the construction of affirmative and negative debate cases, preparation of briefs, and participation in intercollegiate tournaments. The second semester places additional emphasis on argumentative and on general theories of argumentation.

COMM 403 Advanced Public Address II
Fall and spring. 2 credits. Limited to 10-15 Program in Speech and Debate members; permission of instructor required. Hours to be arranged. P. Stepp.
The second course in a year-long sequence. Students prepare and present speeches not covered in introductory courses, including limited preparation events (e.g., extemporaneous speaking, in which one composes and presents a speech on current events within a 30-minute period), rhetorical criticism (students apply analytic tools to extant speeches to reveal their structure and intent), and special events, which typically involve unusual constraints upon the speaking situation. Students also do advanced work in informative and persuasive speech. Students prepare a minimum of four different kinds of speeches for tournament presentation.

COMM 405 Communication and Leadership Challenge: Enrichment through Involvement
Fall and spring. 2 credits. May be repeated for credit. Limited to 10-15 Program in Speech and Debate members; permission of instructor required. Hours to be arranged. P. Stepp.
Students share their communication and leadership talents in structured experiences of help to others. They design and implement speech or debate projects for the benefit of one or more groups in our increasingly diverse population. Our students could create instructional modules with accompanying instructional materials for use in area schools and for local CATV and could appear at area public schools to demonstrate and teach their particular skill.

COMM 410 Organizational Behavior and Communication
Fall or summer. 3 credits. Labs limited to 15 junior, senior, or graduate students.
Prerequisite: COMM 116 or equivalent.
Study of management and leadership in formal organizations with emphasis on the psychology of communication between supervisor and employee, examination of formal and informal communication networks, and interpersonal communication in an organizational context. Case studies analyzed in lab. Lectures concurrent with COMM 510; graduate students should enroll in COMM 510.

COMM 411 Leadership from a Communication Perspective
Fall and spring. 3 credits. Limited to 30 students. Lec, T R 12:20-1:35. P. Stepp.
Leadership is a product of human communica­tion. Leadership competence can be increased by increasing communication competence. Leadership theories, particularly transformational leadership will be studied, and gender/minority responsive leadership will be stressed. Practical application will include leadership exercises and observation of leaders.

COMM 416 Psychology of Communication
Fall. 3 credits. Prerequisite: COMM 116, introductory psychology, or permission of instructor. Lec, T R 10:10-11:25.
N. F. Awa.
An advanced multidisciplinary study of psychological and sociological primary source materials that have influenced the development of communication theories and paradigms. Topics include rhetoric and persuasion, power of language in advertising and social communication, behavorism and social learning theories, attitudes and behavior, personal interaction, and effectiveness of messages. Students are expected to develop critical thinking skills for analyzing the work of major communication theorists.

COMM 418 Communication and Persuasion
Spring. 3 credits. Prerequisite: COMM 116 and 120 or introductory psychology or social psychology, COMM 382 or other introductory research methods course. M W F 11:15-12:05 (one evening mid-semester prelim). M. Shapiro.
The course focuses on theories of communication influence on persuasion and attitude change. Students will become familiar with a variety of social-psychological theories of attitude change and persuasion. Those theories also will be applied to a variety of communication situations including mass communication, advertising, public relations/social information, interpersonal communication. Lectures concurrent with COMM 618; graduate students should enroll in COMM 618.

COMM 420 Public Opinion and Social Psychology
Fall. 3 credits. Prerequisite: COMM 382; limited to seniors. Not offered 1995-96.
The course provides an overview of the theoretical and applied literature related to the concept "public opinion." Students investigate how public opinion is perceived and acted upon by society. Relationships between public opinion, communication and social psychological variables are examined. Public opinion is studied using current theoretical and practical applications. Analysis and interpretation of public opinion polls and trends in public opinion for specific issues. Lectures concurrent with COMM 620. Graduate students should enroll in COMM 620.1

COMM 421 Communication and the Environment
Spring. 3 credits. Limited to 20 junior, senior, or master's level students; permission of the instructor. Lec T R 2:30-3:45. J. Shanahan.
Students will investigate how values, attitudes, social structure, and communication affect public perceptions of environmental risk and public opinion about the environment. A primary focus will be mass media's impact in public perceptions of the environment, how the media portray the environment, and discussion of the implications of public consumption of environmental content.

COMM 422 Psychology of Television
Fall. 3 credits. Prerequisites: Introductory psychology and COMM 120, COMM 382 or other introductory research-methods course. M W F 12:20-1:10 (one evening mid semester prelim). M. Shapiro.
A survey of knowledge about the psychologi­cal influence of television and other audiovisual communication technologies. Topics may include: the history of concerns about television and movies, who watches television and why, how people understand and mentally process television, how television influences thinking and emotions, the effects of various forms (including entertainment, news, and advertising), the future forms of mass media including multimedia and virtual reality. Lectures concurrent with COMM 622; graduate students should enroll in COMM 622.

COMM 426 Ethics in the Media
Course will examine the moral questions of deception, trade-offs in public vs. private interests, and manipulation in the context of specific issues arising in the operation of the media. There will be assigned readings in moral philosophy and ethics as background for case discussion. Students from disciplines outside communication are encouraged to enroll.

COMM 428 Communication Law
Spring. 3 credits. Limited to junior, senior, and graduate students; others by permission of the instructor. Lec. M W F 11:15-12:05. D. Grossman.
A practical survey of the law governing mass media; primarily focused on the student's working in the field. Coverage includes restraints on news gathering and publication, privacy, defamation, copyright, broadcast and cable regulation, access, electronic media and other issues of current interest.

COMM 439 Interactive Multimedia: Design and Research Issues
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1995-96; next offered 1996-97. Lec, T 10:10-11:00; lab 11:15-1:10. G. Gay.
An overview of interactive multimedia technologies (videodisc, CD-ROM, digital video technologies, computer graphics, and text). Course will focus on theories and research applicable to interactive multimedia.
such as visualization, learner control, mental models, knowledge representations, and information processing. Course will also emphasize interactive multimedia design, application, and evaluation."

COMM 440 Social Design of Communications Systems
Course will focus on the design of computer interfaces and software from the user's point of view. The goal is to teach user interface designs that "serve human needs" while building feelings of competence, confidence, and satisfaction. Topics include formal models of people and interactions, collaborative design issues, psychological and philosophical design considerations, and cultural and social issues.

COMM 460 Video Communication I: Basic Concepts and Theory, Planning, and Participatory Production
Summer only. 2 credits. Fee: $50.00. T R 9:00-4:00. S. White and staff. The course focuses on understanding video as a tool in development communication. Handout includes guidelines for use of the video portapak and editing systems. Participants produce videotapes emphasizing the power of images, video for individual feedback, group process observation, and process intervention for individual and community development.

COMM 461 Video Communication II: Video for Development/Social Intervention
Summer only. 3 credits. Prerequisites: COMM 460 and/or permission of instructor. M W F 10:10-1:00. S. White and staff. Explores the use of video in the context of development. Covers advanced visualization concepts and techniques and issues relevant to appropriate application of video technologies. Participants develop and implement proposals for creating a videotape designed to meet specific communication objectives.

COMM 465 Scientific Rhetoric
Spring. 3 credits. Not offered 1995-96. Exploration of the development of scientific discourse since the Scientific Revolution, with special emphasis on understanding the rhetorical purposes served by differing forms and techniques both in historical context and in contemporary science. Readings will include classics from Newton, Darwin, Einstein, and others, along with representative samples of more routine scientific communications. Students will prepare brief reports and mid-term and final papers.

COMM 466 Public Communication of Science and Technology
Fall. 3 credits. Limited to 15 students. Prerequisite: Comm 352 or 360, or Engineering 350, or permission of instructor. Not offered 1995-96. Explore the structure, meanings, and implications of "public communication of science and technology" (PCST). Examine the contexts in which PCST occurs, look at motivations and constraints of those involved in producing information about science for nonprofessional audiences, analyze the functions of PCST. Tie existing ideas about PCST to general communication research, and learn how to develop knowledge about PCST. Course format is primarily seminar-discussion.

COMM 467 Communication, Mood, and Emotion
Fall. 3 credits. Prerequisites: COMM 382 or equivalent. Not offered 1995-96; next offered 1996-97. M W F 1:25-2:15. An examination of theory and research on communication and emotion. The course consists of the following seven areas: defining mood and emotion, tactics for investigation, emotion and cognition, mood and emotion as communication effects, communication as consequence, communication and mood management, and enduring issues. Lectures concurrent with COMM 487; graduate students should enroll in COMM 487.

COMM 489 Communication and Social Phenomena
Spring. 3 credits. Letter grade only. Limited to upper-level students. Permission of instructor. Not offered 1995-96. T R 10:10-11:25. C. Olyshen. Investigation of theoretical and empirical studies of widespread beliefs, collective behaviors, norms, fads, stereotypes, and other collective phenomena which result in outcomes ranging from trivial to catastrophic. Investigations of the role of communication plays in the formation of social groupings and social expression of attitudes and beliefs. Lectures concurrent with COMM 689; graduate students should enroll in COMM 689.

COMM 494 Special Topics in Communication
Fall, spring, or summer. 1-3 credits variable. S-U grades optional. Prerequisite: permission of instructor. Study of topics in communication not otherwise provided by a department course and determined by the interest of the faculty and students.

COMM 498 Internship
Fall, spring, and summer. 1-3 credits. Students must apply no later than the spring pre-course enrollment period for a fall internship or the fall pre-course enrollment period for a spring or summer internship. Limited to communication juniors or seniors. 3.0 average in communication courses, and 3.0 overall average required; S-U grades only. Structured, on-the-job learning experience under supervision of communication professionals in a cooperating organization. Maximum of 6 credits total may be earned; no more than 3 per internship but flexibility allows 6 for 1 credit each, 3 for 2 credits each, or 2 for 3 credits each. Internships must be approved in advance by the student's academic adviser and must be supervised by a communication professional in fields of public relations, advertising, publishing, or broadcasting. Minimum of 60 on-the-job hours per credit required.

COMM 499 Individual Study in Communication
Fall or spring. 1-3 credits; may be repeated to 6 credits with different courses. Limited to junior and seniors. Intended for undergraduates desiring classroom teaching experience. Prerequisite: 3.0 cumulative average (2.7 if teaching assistant for a skill development course) and permission of the faculty member who will supervise the work and assign the grade. Students must register with an Independent Study form (available in 140 Roberts Hall).

COMM 500 Independent Research
Fall or spring. 1-3 credits; may be repeated to 6 credits. Limited to seniors and graduate students. Prerequisite: 3.0 cumulative average. Students must register with an Independent Study form (available in 140 Roberts Hall).

COMM 510 Organizational Behavior and Communication
Fall or spring. 3 credits. Labs limited to 15 junior, senior, or graduate students. Prerequisite: COMM 400 or equivalent. Lect. T R 12:20-1:10; sec, W 3:00-5:30. Study of management and leadership in formal organizations with emphasis on the psychology of communication between supervisor and employee, examination of formal and informal communication networks, and interpersonal communication in an organizational context. Case studies analyzed in lab. Lectures concurrent with COMM 410; graduate students should enroll in COMM 510.

COMM 612 Intercultural and Development Communication
Fall. 3 credits. Prerequisites: COMM 410/510 or one course in organizational behavior or permission of instructor. Lect. T R 12:20-2:15. Examination of contemporary research on the social psychology of interpersonal communication in organizations including supervisor-employee relations, leadership style, work motivation, organizational socialization, and formal and informal communication networks.

COMM 612 Intercultural and Development Communication
Fall. 3 credits. Prerequisites: COMM 410/510 or one course in organizational behavior or permission of instructor. Lect. T R 12:20-2:15. Examination of contemporary research on the social psychology of interpersonal communication in organizations including supervisor-employee relations, leadership style, work motivation, organizational socialization, and formal and informal communication networks.

COMM 63 Communication and Social Change
Fall or spring. 3 credits. Prerequisite: COMM 400 or equivalent. Lect. T R 12:20-2:15. N. Awa.

COMM 65 Communicative Style
Fall, spring, or summer. 1-3 credits variable. S-U grades optional. Prerequisite: COMM 400 or equivalent. Lect. T R 12:20-2:15. N. Awa.

COMM 66 Communicative Style
Fall, spring, or summer. 1-3 credits variable. S-U grades optional. Prerequisite: COMM 400 or equivalent. Lect. T R 12:20-2:15. N. Awa.

COMM 67 Communication and Social Change
Fall or spring. 3 credits. Prerequisite: COMM 400 or equivalent. Lect. T R 12:20-2:15. N. Awa.

COMM 68 Communication and Social Change
Fall or spring. 3 credits. Prerequisite: COMM 400 or equivalent. Lect. T R 12:20-2:15. N. Awa.

COMM 69 Communication and Social Change
Fall or spring. 3 credits. Prerequisite: COMM 400 or equivalent. Lect. T R 12:20-2:15. N. Awa.

COMM 70 Communication and Social Change
Fall or spring. 3 credits. Prerequisite: COMM 400 or equivalent. Lect. T R 12:20-2:15. N. Awa.

COMM 71 Communication and Social Change
Fall or spring. 3 credits. Prerequisite: COMM 400 or equivalent. Lect. T R 12:20-2:15. N. Awa.
nutrition, and the like. The subtleties and complexities of nonverbal codes are explored and barriers to effective listening in intercultural trade and business broached.

COMM 616 Interpersonal Communication
Spring. 3 credits. Limited to graduate students in communication; others by permission of instructor. M W 10:10-12:05. N. Awa.

The seminar explores foundational theories and principles of interpersonal communication as well as theories and methods in the newly emerging area of social cognition. Together, these groups of theories seek to explain human communicative behavior in a variety of settings through understanding of the cognitive processes and mental activities that underlie such behavior. In addition to theory, students will engage in experiential learning activities designed to provide balance between principles and practice. Topics covered include: the nature, structure, and functions of nonverbal communication; expectancy formation and development; stereotyping and attribution; perception, attention, and memory; and the cognition-behavior relationship.

COMM 618 Communication and Persuasion
Spring. 3 credits. Prerequisite: COMM 116 and 120 or introductory psychology or social psychology, COMM 382 or other introductory research methods course. The course focuses on theories of communication influence, persuasion, and attitude change. Students will become familiar with a variety of social-psychological theories of attitude change and persuasion. Those theories also will be applied to a variety of communication situations including mass communication, advertising, public relations/public information, and interpersonal communication. Lectures concurrent with COMM 418; graduate students should enroll in COMM 618.

COMM 620 Public Opinion and Social Processes
Fall. 3 credits. Prerequisite: COMM 382, limited to seniors. Not offered 1995–96.
The course provides an overview of the theoretical and applied literature related to the concept “public opinion.” Students investigate how public opinion is perceived and acted upon by society. Relationships between public opinion, communication and social psychological variables are examined. Public opinion is studied using current theoretical and practical applications. Analysis and interpretation of public opinion polls and trends in public opinion on specific issues. Lectures concurrent with COMM 420. Graduate students should enroll in COMM 620.

COMM 622 Psychology of Television
Fall. 3 credits. Prerequisite: introductory psychology or COMM 120; COMM 382 or other introductory research-methods course.
A survey of knowledge about the psychological influence of television and other audiovisual communication technologies. Topics may include: the history of concerns about television and movies, who watches television and why, how people understand and remember television messages, how television influences thinking and emotions, the effects of various forms (including entertainment, news, and advertising), the future forms of mass media including multimedia and virtual reality. Lectures concurrent with COMM 422; graduate students should enroll in COMM 622.

COMM 624 Communication in the Developing Nations
Fall. 3 credits. Open to seniors and graduate students. T 12:25-4:25. R. D. Colle.
The role of communication in development programs, particularly in Third World nations. Emphasis is on communication interventions in agriculture, health, nutrition, family planning and community development, and especially on methods for designing communication strategies for reaching low-income, rural people. Among the approaches considered are extension, social marketing, and development support communication.

COMM 625 Communication for Social Change
Summer only. 3 credits. T R 9:00-1:00. Staff.
A survey of international communication problems and perspectives on social change, with a special focus on the Third World. Concentration on critical issues of communication policy and planning at local, national, and international levels, and the impact of new communication technologies.

COMM 626 Impact of Communication Technologies
Fall. 3 credits. Open to seniors. W F 12:20-2:15. P. Yarbrough.
A study of emerging technologies of communication, such as computer-based information systems and satellites and their potentials for influencing communication processes and social systems. Also examines the impacts of previous communication innovations from cave painting to television.

COMM 639 Interactive Multimedia: Design and Research Issues
An overview of multimedia technologies (videodisk, CD-ROM, digital video technologies, computer graphics, and text). Course will focus on the use of multimedia in an interactive multimedia environment such as visualization, learner control, social mental models, knowledge representations, and information processing. Course will also emphasize interactive multimedia design, application, and evaluation.

COMM 640 Social Design of Communication Systems
Course will focus on the design of computer interfaces and software from the user's point of view. The goal is to teach user interface designs that "serve human needs" while building feelings of competence, confidence, and satisfaction. Topics include formal models of people and interactions, collaborative design issues, psychological and philosophical design considerations, and cultural and social issues.

COMM 675 Communication Planning and Strategy
Spring. 3 credits. T R 10:10-12:05. C. Sherry.
Seminar in the planning of communication activities for the support of directed social-change programs. Course seeks to integrate theory, data-based generalizations, and planning processes into an integrated communication planning model. Student studies and discussion focus on communication aspects of social change efforts in nutrition and health, rural development, marketing, and the environment.

COMM 680 Studies in Communication
Fall. 3 credits. Limited to graduate students in communication; others by permission of instructor. M W 9:05-10:45. J. Shanahan.
A review of classical and contemporary readings in communication, including key concepts and areas of investigation. An examination of the nature of the field, the interrelationships of its various branches, and an examination of the role of theory in the research process.

COMM 681 Seminar in Psychology of Communication
Spring. 3 credits. Prerequisite: graduate students in communication; others by permission of instructor. M W 12:20-1:10; sec, F 12:20-2:15. D. McDonald and P. Yarbrough.
An introduction to theory and research in the mental processes of the communicating individual. Discussions and readings may include how individuals process and remember communication information, how communication information is used in decision processes, how motivation influences processing of mass communication information, and how attitudes form and change.

COMM 682 Methods of Communication Research
Spring. 3 credits. Prerequisite: COMM 680 or equivalent. Lect, T 1:25-4:25. P. Yarbrough.
Experience in quantitative research techniques. The course provides an introduction to inter- and multi-disciplinary research through examination of the procedures, techniques and assumptions associated with particular techniques of design and measurement, data collection, data preparation, data analysis, and hypothesis testing. Readings include a variety of fields and disciplines in the social and natural sciences.

COMM 684 Qualitative Methods in Communication Research
This course explores the nature of communication research and the place of qualitative methods in that research. Through readings, discussions, and papers, students will examine the various techniques of qualitative research, gaining both an introduction to those methods and an appreciation of when those methods are appropriate for addressing specific issues in communication.]
COMM 685 Training and Development: Theory and Practice (also International Agriculture 685 and EDUC 685)
Analysis, design, and administration, and evaluation of training programs for the development of human resources in small-farm agriculture, rural health and nutrition, literacy and nonformal education, and general community development. Design for the scientist, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the U.S. and abroad.

COMM 687 Communication, Mood and Emotion
Fall. 3 credits. Prerequisites: COMM 382 or equivalent. Not offered 1995–96; next offered 1996–97. D. McDonald.
An examination of theory and research on communication and emotion. The course consists of the following seven areas: defining mood and emotion, tactics for investigation, emotion and cognition, mood and emotion as communication effects, communication as consequence, communication and mood modifying issues, and communication and mood altering issues. Lectures concurrent with COMM 487; graduate students should enroll in COMM 687.

COMM 688 Participatory Communication for Research and Development
Summer only. 3 credits. Prerequisites: Qualitative research or graduate-level communication course and/or permission of instructor. Lects, T R 1:00–5:00; disc, arranged 2 hours/week. S. White.
Conceptual framework and theoretical rationale for utilizing participatory approaches in communication and research for rural development and social action. Case examples and video documentation from India, Africa, Latin America. Focus is on problem-solving approaches in communication and use of video as a communication tool for enhancing people’s participation in the development context.

COMM 689 Communication and Social Phenomena
Investigation of the theoretical and empirical studies of widespread beliefs, collective behaviors, norms, fads, stereotypes and other collective phenomena which result in outcomes ranging from trivial to catastrophic. Investigations of the role communication plays in the formation of social groupings and social expression of attitudes and beliefs. Lectures concurrent with COMM 489; graduate students should enroll in COMM 689.

COMM 693 Seminar: Topics in Communication
Fall and spring. No credit. S-U grades only. Hours to be arranged. Staff.
Some weeks scholars from a wide variety of fields will present varied topics in theory or research as it relates to communication. Other weeks graduate students will present thesis (project) proposals to faculty and peers.

COMM 694 Special Topics in Communication
Fall, spring, or summer. 1–3 credits variable. S-U grades optional. Prerequisite: permission of instructor. Hours to be arranged. Staff.
Study of topics in communication not otherwise provided by a department course and determined by the interest of the faculty and students.

COMM 700 MPS Project Research
Fall or spring. 1–6 credits. May be repeated for a maximum of 6 credits. Prerequisite: permission of committee chair.
Project research for Master of Professional Studies (Communication) students.

COMM 710 Methods of Communication Analysis in Organizations
Spring. 3 credits. Prerequisite: Comm 610 or equivalent and one graduate level course in organizational behavior. Next offered spring 1997. M W 2:35–5:05. D. Schwartz.
Methods for analyzing communication structure and processes in organizations with emphasis on communication network analysis and forms of intervention research such as communication audits and employee attitude surveys.

COMM 792 Advanced Communication Studies
Fall or spring. 3 credits. Limited to communication graduate students. May not be repeated. Students must use the faculty member’s section number to register. Independent studies and projects are carried out in conjunction with selected undergraduate courses.

COMM 794 Seminar in Communication Issues
Fall, spring, or summer. 1–3 credits. Prerequisite: permission of instructor. Not offered 1995–96. Small group study of topical issue(s) in communication not otherwise examined in a graduate field course.

COMM 797 Graduate Independent Study
Fall, spring, or summer. 1–3 credits. Prerequisite: permission of instructor. Individual study concentrating on locating, assimilating, synthesizing, and reporting existing knowledge on a selected topic.

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

COMM 799 Graduate Research
Fall, spring, or summer. 1–3 credits. Prerequisite: appropriate communication graduate course work or permission of instructor. Small-group or individual research based on original, empirical, data-based designs regarding topical issues in communication not otherwise examined in a graduate field course.

COMM 800 Master’s-Level Thesis Research
Fall or spring. 1–6 credits. May be repeated for a maximum of 6 credits. Prerequisite: permission of committee chair.
The thesis research for Master of Science (Communication) students.

COMM 901 Doctoral-Level Dissertation Research
Fall or spring. 1–9 credits. May be repeated for a maximum of 9 credits. Prerequisites: completion of “A” exam; permission of committee chair.
Dissertation research for doctoral candidates.

EDUCATION

EDUC 005 Basic Review Mathematics
Fall. 3 credits (this credit is not counted toward the 120 credits required for the degree). Primarily for entering students. Prerequisite: three years of high school mathematics, through trigonometry, or EDUC 005. Lecs, M W F 8:00 or 9:05. S. Piliero.
This course is designed to offer a nontraditional approach to college-level precalculus mathematics, stressing conceptual understanding and problem solving applications. Considerable emphasis is placed on the numerical, graphical and algebraic representations of functions and their transformations. Students will use Function Probe®, a multi-representational mathematical software program, in a computer lab-based setting.

EDUC 115 Introductory College Mathematics
Fall or spring. 4 credits. Prerequisite: three years of high school mathematics, through trigonometry, or EDUC 005. This course is designed to offer a nontraditional approach to college-level precalculus mathematics, stressing conceptual understanding and problem solving applications. Considerable emphasis is placed on the numerical, graphical and algebraic representations of functions and their transformations. Students will use Function Probe®, a multi-representational mathematical software program, in a computer lab-based setting.

EDUC 120 Education for Empowerment
Spring. 1–3 credits. T R 2:30–4:00. A modular course, with each module spanning 5 weeks for 1 credit. Common themes running through the modules include human learning, teaching strategies, political/social/economic factors affecting education. The course provides an opportunity to sample different areas of study and to gain knowledge and awareness of one’s own educational processes.
This course is designed for all students who work builds on those experiences and is interested in finding out more about teaching. Topics include the selective contributions of developmental, social, and experimental psychology, including instructional technology, to American education.

EDUC 240 The Art of Teaching
Fall and spring. 3 credits. Prerequisite: EDUC 200 or permission of instructor. This course is designed for all students interested in finding out more about teaching. Students engage in field experiences to find out what teaching involves. Possible field experiences range from large group to tutorial situations, from preschool to adult education, from traditional school subject matters to recreational and vocational areas, and from school-based to nonformal situations. Class work builds on those experiences and provides skills and concepts to make the field experiences more profitable.

EDUC 247 Instructional/Informational Application of Microcomputers and Related Technologies
Fall and spring. 3 credits. Not available to students who have completed ABEN 101 or ABEN 102. Lec., T 2:30-4:25 or W 2:30-4:25. M. Evertt and staff. This is an introduction to the field of instructional/ informational applications of microcomputers and teaching introduction to intermediate-level skills. Class instruction will be microcomputer and networked applications in both formal and informal educational settings. Independent study project required for third credit.

EDUC 271 Sociology of Education
Fall. 3 credits. T 10:10–11:25. Staff. An introduction to the sociological study of schooling and education. Topics include the effects of social factors on educational achievement, the norms and values learned as part of the process of schooling, the relations between students and teachers, and the school's relations to the economic and political systems. All levels of education, from elementary school to the university, are considered.

EDUC 311 Educational Psychology
Fall. 3 credits. Prerequisite: introductory psychology. S/U grades optional. Not offered 1995–96; next offered fall 1996. M W F 11:15-12:05. D. Schrader. This course applies psychological concepts to educational settings such as schools with a focus on understanding the interaction between people, context and knowledge, schools and other learning environments, and education as a social, moral and interpersonal enterprise that respects differences between individuals. This course is designed to foster effective teaching and learning in various educational contexts.

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

EDUC 317 Psychology of Adolescence
Spring. 3 credits. Prerequisite: introductory psychology course. M W 11:15-12:05. D. Schrader. This course surveys the nature of adolescent cognitive, social, moral, and self-development. Theories of adolescence are examined in the context of real-life experiences of adolescents using case analysis as a methodological tool. Educational implications will be discussed for both formal and informal settings.

EDUC 331 Careers in Agriculture, Extension, and Adult Education
Fall. 1-3 credits. Letter grade only. M. 200–4:25. D. Deshler and D. Foster. This course will offer modules in three areas of teaching: Adult Education, Cooperative Extension, and Agricultural Education. Each module will offer one hour of credit, and students may take one or more of the modules. The course offers a historical perspective and an introduction to the organization and scope of programs for each module. Students will examine career opportunities and characteristics of the professions associated with each module. Course activities include field observations and experiences during arranged times.

EDUC 332 Instructional Methods in Formal and Non-formal Education
Spring. 3 credits. Staff. Selection, practice, and evaluation of methods in formal and non-formal education will be stressed. The course will focus on both general teaching strategies and methodology unique to teaching in schools and non-school settings. Course activities include microteaching and field experience during arranged times.

EDUC 335 Youth Organizations
Spring. 3 credits. Not offered 1995–96. 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 of an adult volunteer leader may play. The course is designed to give students an in-depth, learning-by-doing experience of how youth organizations function. The course experience with a recognized youth organization is required.

EDUC 352 Reading Statistics
Fall. 1 credit. T 12:20–1:10. J. Millman. An introduction to statistical vocabulary and symbolism frequently used in reporting empirical research in education and other social sciences. Students are taught how to comprehend statistical terminology and results.

EDUC 370 Issues in Educational Policy
Spring. 3 credits. T R 10:10–11:30. K. A. Strike. An examination of selected policy issues in current education. Included are such topics as equality of educational opportunity, student, parent, and teacher rights; and educational politics. Issues are treated from legal, sociological, and economic perspectives. Meets group C requirements for College of Agriculture and Life Sciences.

EDUC 378 Political Economy of Education
Fall. 3 credits. S-U grades optional. T R 12:20–2:15. Staff. A policy oriented examination of educational systems with an emphasis on political and economic perspectives. Attention will be paid to both external and internal aspects of educational activities. Specific topics will include the changing contributions of education to earnings, school-community relations, power within educational organizations, the impact of technology in the workplace and in classrooms, and the sources and impact of educational costs. A variety of education settings will be examined including higher education and non-formal education.

EDUC 380 Independent Honors Research in Social Science
Fall or spring. 1–6 credits. Limited to students who have met requirements for the honors program. S/U grades optional. A maximum of 6 credits may be earned in the honors program.

EDUC 401 Our Physical Environment
Fall. 3 credits. Prerequisite: permission of instructor. Charge for laboratory supplies, approximately $7. Not offered 1995–96; next offered 1996. T 12:20–1:10. V. N. Rockcastle. A practical, relatively nonmathematical study of some basic relationships and physical interactions in the environment, with emphasis on physics and earth science. Attention is paid to analysis for understanding and techniques for teaching. An individual research project is included. Useful for teachers, environmental educators, and those for whom physical science seems difficult or uninviting.

EDUC 402 Knowing and Learning in Science and Mathematics
Fall. 4 credits. Prerequisite: enrollment in science and math certification program or permission of instructor. M W 2:30–4:00. V. N. Rockcastle. A practical, relatively nonmathematical study of some basic relationships and physical interactions in the environment, with emphasis on physics and earth science. Attention is paid to analysis for understanding and techniques for teaching. An individual research project is included. Useful for teachers, environmental educators, and those for whom physical science seems difficult or uninviting.
EDUC 403 Observing and Teaching Science and Math
Spring. 4 credits. Prerequisites: Enrollment in a Cornell teacher education program or permission of the instructor. W F 3:35-5:15. W. S. Carlsen.

Designed for prospective secondary teachers, this course provides a multiple-perspectives orientation to the culture of schools and the work of teaching science and mathematicians. Students spend 6-8 hours each week observing in area schools. Students also plan and teach innovative lessons in the scheduled teaching laboratory. Readings and discussions concern models of instruction, teacher knowledge, educational equity and tracking, and classroom language.

[EDUC 411 Introduction to Educational Measurement
Fall. 3 credits. Not offered 1995-96. J. Millman.

Presents practices and theories of the measurement of human knowledge and performance. Students will be expected to acquire the practical skills of planning and constructing tests for a variety of purposes, interpreting and using test results, evaluating commercially available instruments, and the like. Students will also be expected to discuss intelligently a myriad of social, ethical, legal, and technical issues associated with educational testing. One course in statistics or concurrent registration in Education 352 is recommended but is not required.]

EDUC 413 Psychology of Human Interaction
Fall. 3 credits. Enrollment limited. Prerequisite: permission of instructor. Fee, $5. T R 10:10-12:05. D. E. Hedlund.

Designed to develop skills for, and understanding of, effective interpersonal communication and interaction. Appropriate for students in the helping professions, education, and areas involving management of human resources.

EDUC 414 Counseling Psychology
Spring. 4 credits. Limited to 30 students. Prerequisites: introductory psychology, social or personality psychology, and EDUC 413. T R 10:10-12:05. D. E. Hedlund.

The processes of counseling are examined from various theoretical perspectives. Typical adult counseling issues are examined, and implications are drawn for counseling strategies with an adult population, including psychological assessment, establishing therapeutic goals, intervention strategies, and evaluation of outcomes.

EDUC 420 Field Experience
Fall or spring. 1-4 credits. S-U grades optional. Undergraduates must attach to their course enrollment material written permission from the faculty member who will supervise the work and assign the grade. Staff.

Students may engage in planned, semiprofessional, or professional practice in an educational enterprise. Each student prepares a plan of action, including rationale, purposes, and procedures and arranges with a faculty member to supervise and evaluate the field experience.

EDUC 430 Special Problems in Agricultural Education
Fall, spring, or summer. 1-3 credits. S-U grades optional. An opportunity to study individually selected problems in agricultural education.

EDUC 432 Teaching Agriculture: Methods, Materials, Practice
Fall. 9 credits. Prerequisites: EDUC 332 and concurrent registration in EDUC 430 and 497. M. Ewert.

Directed participation in teaching agriculture at the secondary school level. Program includes a five-day intensive on-campus period and periodic seminars addressing selected methods and materials in teaching agriculture, combined with a 14-week period in an off-campus student teaching center. Includes evaluation of area resources, instructional materials and facilities, planning and executing instruction, directing work experience, and advising youth organizations.

[EDUC 445 Curriculum Design Workshop

A general practical approach to course planning. Readings, group discussions, workshops, and individual conferences centering on each student's project. This project consists of designing a course in a subject area for an age level and an institutional setting of the student's choosing.]

EDUC 472 Philosophy of Education
Fall. 3 credits. T 2:30-4:25. K. A. Strike.

A study of central issues in the philosophy of education. Questions of ethics, political philosophy, and the theory of knowledge are examined and linked to current educational issues.

EDUC 475 Epistemology and Teaching
Spring. 3 credits. Letter grade only. T R 3:30-4:45. K. A. Strike.

This course emphasizes the critical examination of recent debates in philosophy of science concerning the nature of scientific knowledge and scientific inquiry. It applies these inquiries to such questions as the organization of curricular materials, the nature of effective science teaching, and the role of scientific knowledge in the deliberations of a liberal democracy.

EDUC 477 Law and Educational Policy
Fall. 3 credits. M 2:30-4:25. K. A. Strike.

A study of recent federal court decisions concerning education. Emphasis on examining legal issues against a background of related educational issues and in terms of the consequences of legal decisions for the development and operation of educational institutions.

[EDUC 481 Educating for Community Action

The design and execution of educational aspects of community-action and nonformal education programs. Deals with the identification and statement of educational goals, selection of teaching strategies, and evaluation of outcomes.]

[EDUC 483 Comparative Studies in Adult Education

Focuses on the variety of adult-education programs in countries around the world. Literature on comparative adult education, international conferences on adult education, UNESCO adult-education publications, and international community development are analyzed in relationship to each student's exploration of adult education in two countries. Description of adult education in other countries is shared by international students.]

EDUC 494 Special Topics in Education
Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged. Staff.

The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

EDUC 497 Individual Study in Education
Fall or spring. 1-3 credits. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall). Hours to be arranged. Staff.

A student may, with approval of a faculty advisor, study a problem or topic not covered in a regular course or may undertake tutorial study of an independent nature in an area of educational interest.

EDUC 498 Undergraduate Teaching
Fall or spring. 1 or 2 credits; 4 credits maximum during undergraduate career. Limited to students with grade-point averages of at least 2.7. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall). Hours to be arranged. Staff.

Participating students assist in teaching a course allied with their education and experience. Students are expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

EDUC 499 Undergraduate Research
Fall or spring. 6 credits maximum during undergraduate career. Not open to students who have earned 6 or more undergraduate research credits elsewhere in the college. Limited to juniors and seniors with grade-point averages of at least 2.7. Students must register with an Independent Study form (available in 140 Roberts Hall). Hours to be arranged. Staff.

Affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.

EDUC 501 Communication Workshop
Summer and intersession. 2 credits. S-U grades optional. M. Glock.

The course focuses on skills enabling individuals to cope with such concerns as motivation, dealing with difficult persons, criticizing productively, improving comprehension, adjusting to different learning styles, and communicating with the public. Practice is coordinated with theory and research
findings. The ongoing dynamics of the course necessitate intense participation over a period of time, not provided by regularly scheduled fifty-minute class periods. Additional auto-
tutorial study is scheduled if appropriate for anyone who works with people.

EDUC 513 Interpersonal Interaction
Summer. 1-2 credits. D. E. Hedlund. Designed to develop skills for an understanding of effective interpersonal communication and interaction. Appropriate for students in the helping profession, education, and areas involving management of human resources. A workshop design is required for the second credit. Participants must bring a tape recorder to class.

EDUC 547 Improvement of College Teaching
Summer. 2 credits. J. D. Novak. Concepts of teaching, learning, curriculum, and governance are used to guide practical activities that enhance faculty competence. Recent studies of concept mapping and learning, structure of knowledge, science teaching, and adult learning, and evaluation provide a conceptual basis for improving teaching.

EDUC 548 Effective College Teaching
Spring. 1-3 credits. S-U grade option. Hours to be arranged. D. Sutphin and M. Ewert. This course is designed to help participants become more effective college teachers. It will examine the basic principle of learning, identify different learning styles, and explore a variety of teaching techniques, methods, and technologies. Participants will also learn how to diagnose a problem and improve their effectiveness as teachers.

EDUC 601 Secondary Science and Mathematics Teaching Practicum
Fall or spring. 3 credits. Prerequisite: permission of instructor. Letter grades only. For graduate students enrolled in the Teacher Education in Science and Mathematics program. M T W R F 8:00-3:00. W. S. Carlsen and staff. Supervised student teaching in science or mathematics at the secondary level. Program includes teaching in a local school for ten weeks.

EDUC 602 Teaching Science/ Mathematics: Methods, Materials, Practice
Fall or spring. 9 credits. Prerequisite: concurrent enrollment in EDUC 601 or permission of instructor. M T W R F 9:00-3:00. W. S. Carlsen and staff. The course begins with full day sessions of intensive consideration of theoretical frameworks relevant to all aspects of student teaching. Assignments and a weekly seminar during the semester require students to use those theories to develop and evaluate teaching materials and practices. Students will complete an extensive portfolio documenting their work.

EDUC 603 Teaching Mathematics
Fall. 3 credits. Offered alternate years. Not offered 1995-96. T R 10:10-11:25. J. Confrey. Current research in mathematics education will be examined in order to develop a picture of the mathematics classroom that integrates subject matter, student conceptions, affective variables, and issues in the social context of learning mathematics. Special topics will include research on problem solving, women and mathematics, misconceptions, and research on teaching.

[EDUC 606 Seminar in Science and Mathematics Education
Fall. 1 credit. S-U grades only. Not offered 1995-96. T R 4:30-5:40. J. Confrey. Explores topics in science and mathematics education. The focus of the seminar changes each year.]

EDUC 609 Educational Ethnography
Spring. 3 credits. Prerequisite: course in research methods or measurement or permission of instructor. M T W 2:30-4:00. D. J. Trumpf. The course will study educational ethnography as a form of interpretive research, a perspective that attends to the complex interactions between researcher, researched, and context and accepts the centrality of meaning-making in the conduct of human affairs. Students will examine some of the philosophical debates about research approaches and will discuss research methods as they relate to the assumptions of interpretive research. Students will conduct a joint research project during the course of the semester.

[EDUC 611 Educational Psychology
Fall. 3 credits. Prerequisite: introductory psychology. S-U grades optional. Not offered 1995-96; next offered fall 1996. M W 11:15-12:05. 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. A life span developmental approach is used, appropriate for those seeking an introduction to educational psychology or a refresh course in contemporary educational psychology.]

EDUC 613 Theory and Methods for Education
Fall. 3 credits. Prerequisite: EDUC 311 or 611 or permission of instructor. T R 9:05-9:55. Presents a coherent theory of education combining concepts from philosophy, psychology of learning, curriculum, and instruction. New educational methods, including concept mapping and clinical interviews, will be presented. Students will gain competence by applying concepts and methods in programs related to their interests. Classes include discussion of student-initiated questions and use of videotape to analyze educational techniques.

[EDUC 614 Epistemological Development and Reflective Thought
Fall. 3 credits. S-U grades optional. Not offered 1995-96; next offered spring 1996. 1 hr disc to be arranged. D. E. Schrader. Insight into how individuals make sense of knowledge is essential to teaching and learning. This course examines theories of intellectual development and their implications for educating students of various age groups, particularly college students. The role of reflection on thinking (metacognition) and its impact on development of thought is explored.]

[EDUC 615 Self and Interpersonal Development and Education
Spring. 3 credits. S-U grades optional. Not offered 1995-96. M T W 12:20-2:15. D. E. Schrader. Interpersonal interactions affect teaching and learning. This course takes a life-span perspective as it explores constructive-developmental theories of self and others, and how such theories explain students' understanding of their own and others' actions in educational contexts.]

EDUC 620 Internship In Education
Fall or spring. 1-6 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. An opportunity for practical experience in educational professions development.

EDUC 621 Work-Experience Coordinator Certification Course I
Summer. 3 credits. S-U grades optional. The first of a two-course sequence designed to develop the competencies needed for certification as a coordinator of diversified cooperative work experience programs. The course focuses on the history and philosophy, types of operation, and evaluation of work experience programs including articulation with JPTA and VESID. Field interviews are required. A prerequisite for Course II, EDUC 622.

EDUC 622 Work-Experience Coordinator Certification Course II
Summer. 3 credits. Prerequisite: EDUC 621 Work-Experience Certification Course I. The second course for certification as a diversified cooperative work experience coordinator combines course work and directed field experience leading to the planning, development, and approval of a work-experience program in a local educational agency. Development of a philosophy and policy statement, budget, curriculum for related instruction, annual work plan, by function, promotional materials, and all program forms for Board of Education approval required.

EDUC 630 Special Problems in Agricultural and Occupational Education
Fall or spring; may also be offered in summer. 1-3 credits. S-U grades optional. Hours to be announced. Staff. The course provides an opportunity for graduate-level study of individually selected problems and issues in agricultural and occupational education. Designed for experienced teachers.

EDUC 632 Teaching Agricultural, Extension, and Adult Education
Spring. 3 credits. Prerequisite: an introductory course in teaching methods or permission of instructor. M 8:00-10:00. Staff. The focus of the course is on the selection, use, and evaluation of methods and materials for teaching. Methods for group and informal instruction are covered. Opportunity is provided for students to develop teaching competence based on their individual needs and interests. Development of self-evaluation skills is included. A class project on the development of instructional materials is required.
EDUC 653 Program Planning in Agricultural, Extension, and Adult Education
Fall. 3 credits. Field trip. Not offered 1995-96. Lec; T 2:30-4:30; lab, to be announced. Staff. Current social and economic conditions affecting agricultural, extension, and adult education are examined. Principles, objectives, strategies, and sources of information are applied to program planning. Participants have an opportunity to observe ongoing programs in agricultural, extension, and adult education, and to pursue individual interests in program development and improvement.

EDUC 644 Curriculum Theory and Analysis
Spring. 3 credits. G. J. Posner.
An examination of the basic elements involved in making curriculum decisions and an analysis of current approaches to curriculum. The course focuses on the assumptions underlying any curriculum. The major task of each student is to choose and conduct an in-depth analysis of a curriculum. This course is the basic graduate course in curriculum.

EDUC 647 Instructional Technologies: Analysis and Practices
Fall. 2-3 credits. Prerequisite: skills in statistics and research design. Letter grade only. Lec; R 2:30-3:30; lab and seminar to be announced. D. Peasley. Current research and literature on instructional computing and related technologies in the public and private sectors will be examined. Students complete a group research project on educational technologies and meet for five seminar sessions to earn 2 credits. The research experience includes design, data collection, input, analysis, and synthesis. Concurrent attendance in ED 247 Modules A and B is required (2 credits); or the modules may be taken as a prerequisite.

EDUC 650 Methods of Educational Inquiry
Fall. 1 credit. J. Millman. A survey of approaches to inquiry in the social sciences, including experimental and comparative designs, survey research, case study, philosophical and historical inquiry, content analysis, and secondary data analysis. The course is intended to broaden the student's views of appropriate methods of disciplined inquiry.

EDUC 651 Writing a Thesis Proposal
Fall. 1 credit. S-U grades only. T 3:35-4:25. J. Millman. Procedures for developing and writing a master's or doctoral thesis proposal. Emphasis will be given to identifying a significant topic, recognizing weaknesses in illustrative proposals, and clear and concise writing. Students will be provided ample assistance in constructing a brief thesis proposal of their own.

EDUC 659 Special Topics in Research Methods
Spring. 2-3 credits. Prerequisite: permission of instructor. S-U grades only. Hours to be arranged. J. Millman. Coordination of crew techniques and current topics in educational research design, measurement, or evaluation of programs, products, and personnel.

EDUC 661 Administration of Educational Organizations
Fall. 3 credits. Not offered 1995-96. W 3:35-6:00. F. J. Halter. Perspectives on the administration of educational organizations. Consideration of social science, legal and ethical theories, and their application to both public schools and higher education. Intended for students who are considering administrative careers, as well as for those who want to further their understanding of schools as organizations.

EDUC 664 Educational Finance
Fall. 3 credits. S-U grades optional. R 3:35-6:00. D. H. Monk. An analysis of the distribution and utilization of public and private resources for educational purposes. The discussion will revolve around the issues of equity, efficiency, and freedom of choice. Alternative methods of financing schools will be evaluated, and the perplexing legal and moral issues raised by such questions as "Who pays?" and "Who benefits?" will be discussed. Specific attention will be given to budgeting, accountability, and productivity. An opportunity for individuals to focus on their area of interest, such as occupational education, the two-year college, or secondary or higher education.

EDUC 665 Administrative Decision Making
Spring. 3 credits. S-U grades optional. W 3:35-6:00. D. H. Monk. An introduction to the decision making theory and its relevance to the field of educational administration. Specific applications will be made to the study and improvement of productivity within educational systems. A wide variety of educational settings will be considered, including higher education and non-formal education.

EDUC 678 Planning Educational Systems
Spring. 3 credits. S-U grades optional. Not offered 1995-96. T 2:30-4:25. D. H. Monk. A seminar focused on a comparative analysis of educational planning as it is practiced in developing nations. Topics will include manpower planning, the social demand approach to educational planning, benefit-cost analysis, and incentive models of planning. The political and economic implications of attempts to plan education will be emphasized.

EDUC 680 Foundations of Extension Adult Education
Fall. 3 credits. Limited to 20 students. S-U grades optional. F 9:05-12:10. D. Deshler. An analysis of alternative purposes, nature, and scope of extension, adult, and continuing education programs in the United States and abroad, with emphasis on the relationship of programs to historical, cultural, political, social settings, definitions, conceptual controversies, philosophical issues, and current research directions will be examined through a seminar approach.

EDUC 681 Designing Extension and Continuing Education Programs
Fall. 3 credits. Prerequisite: permission of instructor. Not offered 1995-96. Designed to help students understand the concepts, principles, and procedures relevant to developing programs and curricula for the continuing education of adults. Emphasis is on such key areas as the nature and role of programming, situation analysis and needs identification, choosing among alternative courses of action, setting program objectives, and program organization.

EDUC 682 Community Education and Development
Fall. 3 credits. For students who have interest or experience in education or development programs in which community is an important concern. Not offered 1995-96; next offered fall 1996 and fall 1998. M. Ewert. An examination of the concept of community; changes in community life; the analysis of community; alternative strategies for community development; patterns of response to community by universities, colleges, schools, cooperative extension, and government service agencies; and such functional dimensions of community education programming as participatory decision making, volunteers, leadership development, council formation and function, interagency coordination, and change-agents roles.

EDUC 685 Training and Development: Theory and Practice (also Communication 685, International Agriculture 685)
Spring. 4 credits. S-U grades optional. Charge for materials, $45. F 9:05-12:05; lab to be arranged. R. D. Colle and D. Deshler. Analysis, design, conduct, administration, and evaluation of training programs for the development of human resources in small-farm agriculture, rural health and nutrition, literacy and nonformal education, and general community development. Designed for scientists, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the U.S. and abroad.

EDUC 690 Research Seminar
Fall and/or spring. No credit. G. Posner and staff. Presentation of current research in the field of education by graduate students and staff. Opportunities to discuss methodology, findings, and other aspects of research.

EDUC 694 Special Topics in Education
Fall, spring, or summer. 1-3 credits. Prerequisite: permission of instructor. S-U grades optional. Hours are to be arranged. Staff. Topics to be announced.

EDUC 711 Contemporary Issues in Educational Psychology
Fall and spring. 2-3 credits. Fall 1995 and spring 1996. M W 11:15. J. Dunn. Spring 1996: hours to be arranged. R. Ripple. This is a graduate-level seminar dealing with key issues in contemporary psychology having implications for educational practice and research. Topics will vary from semester to semester. Students may take the course more than once.

EDUC 714 Moral Development and Education
Spring. 3 credits. S-U grades optional. M 12:20-2:25. D. E. Schrader. This seminar focuses on current topics in moral development research as related to the educational process. Topics include the question of the development of reasoning, gender differences, the relationship between moral judgment and moral action.
questions related to moral education in secondary schools and university settings, and professional ethics in educational settings. This course takes a life-span perspective; however, special emphasis will be placed on development from adolescence through adulthood.

EDUC 715 Seminar in Psychology and Education

Selected topics focusing on the interaction of theoretical and research developments in psychology and education.

EDUC 718 Adult Learning and Development
Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. W 2:30-5:00. R. Ripple and D. Deshler.

Deals with adult development and learning behavior from points of view of educational psychology, and adult education. Inferences are drawn from research to the practice of adult continuing education. Appropriate for graduate students in educational psychology, extension and continuing education, and community service education, and for others interested in adult learning and development.

EDUC 730 Seminar in Agricultural, Extension, and Adult Education
Spring. 2 credits. S-U grades optional. R 8:00-9:55. M. Ewert.

Emphasis on current problems and research in agricultural, extension, and adult education. Includes discussion and analysis of student and staff research.

EDUC 739 Evaluating Programs in Agricultural, Extension, and Adult Education
Spring. 3 credits. Field trip. Not offered 1995-96; next offered 1996-97. This course examines objectives, criteria, and strategies for evaluating programs of agricultural, extension, and adult education. Evaluation models, case studies, and evaluation as a function of program planning and implementation. Participants examine the roles of supervision in evaluation and have an opportunity to develop and apply evaluation instruments. Field trips and resource persons provide opportunities to observe actual evaluation problems and procedures.

EDUC 744 Seminar in College Teaching
Summer. 2-3 credits.

This seminar will be specially designed for Latin college and university professors. It will begin with a review of the current status of knowledge on teaching and learning, presenting a theoretical foundation for education, and move to practice in solving specific teaching problems.

EDUC 745 Seminar in Curriculum Theory and Research
Fall. 3 credits. Prerequisite: EDUC 644, or permission of instructor. T 2:30-5:00.

Theoretical issues in curriculum and appropriate areas for curriculum research are discussed. Two current topics of interest are the hidden curriculum and school reform. Both topics serve to uncover the relation between ideology and research.

[EDUC 762 Research in Educational Administration
Spring. 3 credits. Prerequisite: one course in elementary statistics or permission of instructor. S-U grades optional. Not offered 1995-96. E. J. Haller.

For students interested in learning about the process of formulating and carrying out a piece of empirical research. Studies will focus on policy and administrative issues concerning public education. Seminar participants will have access to large, nationally representative data sets that will permit them to conduct high-quality, publishable studies of U.S. schools, students, teachers, and parents. In the process they will learn some of the costs and benefits of secondary data analysis and gain some familiarity with statistical analyses on a Cornell mainframe computer.

EDUC 772 Seminar in Philosophy of Education
Spring. 3 credits. Prerequisite: permission of instructor. S-U grades optional. W 9:00-11:00. K. A. Strike.

Topics to be announced.

EDUC 783 Comparative Extension Education Systems
Summer. 3 credits. S-U option. M. Ewert.

Extension education in the developing nations is studied using an analytical framework of reference, a hypothetical model comprising such components as community organization, community-based learning, indigenous facilitators and leaders, extension generalists and specialists, training and research-extension linkages. Case materials on alternative extension models and intercountry experiences provide an empirical base.

EDUC 784 Educational Technology-Transfer and Decision Making
Fall. 3 credits. Offered odd years only. Not offered 1995-96. D. Suphin and J. McGonigal.

The educational and program management decisions involved in the adoption of educational technology in extension, rural development, and nonformal education programs are reviewed, and a variety of decision-making approaches is explored. An overall problem-solving method with case study illustrations is used. Consideration is given to strategic and tactical management of the educational organization, as well as to the characteristics of the technology under consideration. The course makes use of recent literature and continuously updated files on current developments in technology application.

EDUC 800 Master's-Level Thesis Research
Fall or spring. Credit to be arranged. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for guiding the work. Hours to be arranged. Staff.

EDUC 900 Doctoral-Level Thesis Research
Fall or spring. Credit to be arranged. Limited to students working on theses or other research and development projects. S-U grades optional. Each student, before course enrollment, must obtain the approval of a faculty member who will assume responsibility for guiding the work. Hours to be arranged. Staff.

Related Course in Another Department

Entomology


Courses by Subject

Agriculture: 260, 264
Behavior: 215, 471, 662
Ecology: 452, 455, 456, 470, 471, 672
Introductory courses: 201, 212, 215
Medical entomology and veterinary entomology: 352
Morphology: 332
Pathology: 463
Pest management: 241, 441, 444, 477, 640
Physiology and toxicology: 370, 483, 490, 685
Systematics: 351, 455, 651, 652, 654

Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

ENTOM 201 Six-legged Science
Fall. 2 credits. S-U grades optional. Offered alternate years. Not offered fall 1995 and 1997; next offered fall 1996.

Lecs, T R 9:05 optional field trips, required lab demonstrations. A. E. Hajek.

Fascinating, frightening, innocuous, injurious, dainty and ethereal, abundant and essential. Visit the amazing world of the insects. Lectures will explore aspects of the wonders of the insects, and their interactions with humans. Opportunities will be offered to investigate insects in the field and laboratory.

ENTOM 212 Insect Biology
Fall. 4 credits. Prerequisites: BIO G 101-102 (may be taken concurrently) or equivalent. Lecs, W F 10:10-11:00; labs T, W or R 1:25-4:25. C. Gilbert.

Introduction to the fascinating world of entomology by focusing on basic principles of systematic, morphological, physiological, behavior, and ecology of insects. The laboratory in early fall includes field trips to collect and study insects in the natural environment. A collection emphasizing ecological, behavioral and taxonomic categories is required.

ENTOM 215 Spider Biology: Life on a Silken Thread
Fall. 2 credits. Prerequisite: Introductory biology or permission of instructor. S-U grades optional. Lecs, M W 1:25-2:15.

J. S. Bayor.

An introduction to the fascinating world of spiders. Evolution, ecology, behavior, and physiology of spiders and their close kin from a modern perspective. Topics include: identification of major spider families, spiders' unique use of silk, risky courtship, predatory behavior, diverse life styles, social spiders, sensory physiology, and potential use in IPM.

ENTOM 241 Applied Entomology
Spring. 3 credits. Prerequisites: BIO G 101-102 or equivalent. Lecs, T R 9:05; lab/disc, T W 12:20-3:15. W. M. Tingley.
Introduction to major pest species and tactics for their management. Discussions of insect pest management requirements on farms, gardens, forests, and urban environments, along with descriptions of control methods, materials, and equipment.

**ENTOM 260 Introductory Beekeeping**
Fall. 2 credits. Lecs, T R 11:15.
R. A. Morse.
Introduces the fundamentals of practical beekeeping, including the life history, physiology, and behavior of honey bees. The classical experiments on the dance language and the role of pheromones are reviewed. Some lectures are devoted to pollination of agricultural crops and the production of honey and beewax.

**ENTOM 264 Practical Beekeeping**
Fall. 1 credit. Limited to 20 students.
Prerequisite: ENTOM 260 (may be taken concurrently). Lab, R 2:4-2:45. R. A. Morse. This course consists of fourteen laboratory sessions to acquaint students with practical methods of colony management. Laboratories involve actual work with honey bee colonies and equipment. Some of the topics covered are management of bees for apple pollination, honey harvesting and processing, and disease identification and control.

**ENTOM 265 Insect Morphology**
Spring. 5 credits. Prerequisite: ENTOM 212 or 241. Offered alternate years. Not offered spring 1996 and 1998; next offered spring 1997. Lecs, M F F 9:05; labs, M F 1:25-4:25. Staff. An introduction to the external and internal anatomy of insects, with emphasis on the comparative and functional aspects. The laboratory is devoted largely to dissection.

**ENTOM 331 Introductory Insect Systematics**

**ENTOM 352 Medical and Veterinary Entomology**
Fall. 3 credits. Prerequisites: BIO G 101-102 or equivalent. S-U grades optional. Offered alternate years. Not offered fall 1995 and 1997; next offered fall 1996. Lecs, T R 10:10; lab, R 1:25-4:25. L. A. Patrician. The ecology of arthropods of medical and veterinary importance in temperate and tropical regions of the world with emphasis on the role they play in causation or transmission of disease. The laboratory involves 2 field trips, techniques of collection and identification, dissections, methods of transmission, means of identification of a blood pathogen and the source of a blood meal.

**ENTOM 370 Pesticides, the Environment, and Human Health (also Toxicology 370)**
Fall. 2 credits. Prerequisites: BIO G 101-102 or equivalent. Offered alternate years. Not offered fall 1995 and 1997; next offered fall 1996. Lecs, T R 9:05.
J. G. Scott.
A survey of the different types of pesticides, their uses, properties, and effects on the environment. Discussion of the risks, benefits, regulation, politics, and current controversies associated with pesticide use.

**ENTOM 441 Seminar in Insect Pest Management**
Spring. 1 credit. Limited to 15 students. Prerequisite: ENTOM 241 or 444 or permission of instructor. S-U grades only. Offered alternate years. Not offered spring 1997; next offered spring 1996 and 1998. Hours to be arranged. M. P. Hoffman and A. M. Shelton. Discussion and analysis of current topics in insect pest management.

**ENTOM 444 Integrated Pest Management (also Plant Pathology 444)**
Fall. 4 credits. Prerequisites: BIOES 261, ENTOM 212 or 241, and PL PA 301 or their equivalents or permission of instructor. Lecs, M W F 9:05; labs M or T 1:25-4:25. P. M. Davis. Lectures integrate the principles of pest control, ecology, and economics in the management of pest-crop systems. Laboratories consist of exercises to reinforce concepts presented in lecture and demonstrate pest monitoring techniques and the application of computer technology to management problems.

**ENTOM 452 Herbivores and Plants: Chemical Ecology and Coevolution (also BIOES 452)**
Spring. 3 credits. Prerequisites: one year of introductory biology; BIOES 261; CHEM 225 or 357/358 and 251 or 301; or permission of instructor. Offered alternate years. Not offered spring 1996 and 1998; next offered spring 1997. Lecs, M W F 11:15-12:05. P. Feeny. Significance of plant chemistry in mediating interactions between plants and herbivorous animals; mechanisms and strategies of plant finding and exploitation by animals; especially insects, and of defense and escape by plants, evolutionary hypotheses for ecological patterns of resistance and attack; implications for human food and agriculture.

**ENTOM 453 Principles and Practice of Historical Biogeography (also BIOPL 453)**

**ENTOM 455 Insect Ecology, Lectures (also BIOES 455)**
Fall. 3 credits. Prerequisites: BIOES 261 or equivalent and ENTOM 212 or equivalent knowledge of another taxon. Offered alternate years. Not offered fall 1996; next offered fall 1995 and 1997. Lecs, M W F 1:15-1:25. R. B. Root. Topics include the nature and consequences of biotic diversity, biogeography, coevolution, adaptive syndromes exhibited by various guilds, population regulation, impact of insects on ecosystems, comparative and functional analysis of communities, and differences in the organization of natural and managed systems. Ecological and evolutionary principles are integrated by thorough study of exemplars.

**ENTOM 456 Stream Ecology (also BIOES 456)**

**ENTOM 463 Invertebrate Pathology**
Spring. 4 credits. Prerequisites: one year of introductory biology. S-U grades optional. Offered alternate years. Not offered spring 1997; next offered spring 1996 and 1998. Lecs, M W F 9:05; labs, T W 1:25-4:25. A. E. Hajek. Lecture presents principles of pathology as applied to invertebrates. Topics explored include non-infectious and infectious diseases caused by viruses, bacteria, fungi, protozoa, and nematodes, epizootiology of insect diseases and use of pathogens for control. Laboratory involves a diversity of pathogens and hosts using techniques such as microscopy, electrophoresis, immunoussay, density gradient centrifugation, soil extraction, and computer simulation.

**ENTOM 470 Ecological Genetics (also BIOES 470)**
Spring. 4 credits. Prerequisites: BIOES 378 or permission of instructor. S-U grades optional. Offered alternate years. Not offered spring 1996 and 1998; next offered spring 1995 and 1997. Lecs, T R 10:10-11:30; disc, 1 hr/wk to be arranged. S. Via. A study of the relationships between genetic and ecological processes in populations. Topics include consequences of genetic variation in age-structured populations; demographic concepts of fitness; evaluation of methods for measuring genetic variation and natural selection on ecologically important traits; genetics of competitive ability and predator avoidance; genetic and ecological aspects of phenotypic plasticity; character displacement; maintenance of genetic variability; limits to selection; and How theory can be used to formulate hypotheses about evolutionary mechanisms in natural populations is considered and experiments designed to test such hypotheses are evaluated.]
ENTOM 471 Freshwater Invertebrate Biology
The lecture explores the morphology, physiology, phylogeny, life histories, behavior, feeding ecology, and evolution of macroscopic freshwater invertebrates with an emphasis on contrasting the attributes of aquatic and terrestrial insects. The laboratory involves field sampling and laboratory identification of invertebrates and stresses the use of keys. Students prepare a collection of freshwater invertebrates.

ENTOM 477 Biological Control
Approach and procedures in biological control of arthropod pests and weeds. Demonstrations focus on biological control of parasitoids and predators. Discussions focus on case histories.

[ENTOM 483 Insect Physiology]
Fall. 5 credits. Prerequisite: ENTOM 212 or permission of instructor. Offered alternate years. Not offered fall 1995 and 1997; next offered in fall 1996. Lecs, M W F 11:15; lab W 1:25–4:25. C. Gilbert.
An introduction to the often unique ways in which insects have met their basic needs. Each organ system is examined with emphasis on basic principles and specific examples. The student will also be introduced to some common methods used in physiological research and to the critical reading of scientific literature.

[ENTOM 490 Toxicology of Insecticides (also Toxicology 490)]
The history, metabolism, and mechanism of action of synthetic and naturally occurring insecticides. Mechanisms of insecticide resistance, evaluation of insecticide toxicity, and new approaches to insect control with biotechnology will be discussed.

ENTOM 494 Special Topics in Entomology
Fall or spring. 4 credits maximum. S–U grades optional. Hours to be arranged. Staff.
The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

ENTOM 497 Individual Study in Entomology
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.

ENTOM 498 Undergraduate Teaching
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Undergraduate teaching assistance in an entomology course by agreement with the instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.
Participating students assist in teaching a course allied with their education and experience. Students are expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.

[ENTOM 631 Systematics of the Coleoptera]
Summer. 3 credits. Max enrollment 18 students. 3 week summer session.
Prerequisites: an introductory course in insect systematics. Offered alternate years. Not offered summer 1996; next offered summer 1997. Lab, M T W R F 9:4–9; Saturday field trips.
A comprehensive review of the comparative morphology, phylogenetic relationships, classification, natural history, and distribution of the Coleoptera, including adult and immature stages. Laboratory practice in identification and methods for collection and study of beetles. A collection is required.

ENTOM 632 Advanced Coleopterology
An advanced course on the phylogeny and classification of selected subclades of Coleoptera. Laboratory exercises in identification of beetles, generally to the level of genus or beyond. Taught by authority on taxon of interest, frequently including a visiting scholar. Can be repeated for credit.

ENTOM 634 Special Topics in Systematic Entomology
Fall or spring; taught on demand. 2–4 credits. Prerequisite: permission of instructor. Staff.
Lectures on the classification, evolution, and biometrics of selected taxa, with accompanying laboratory studies on identification and comparative morphology. Collections sometimes required.

[ENTOM 640 Applied Ecology and Pest Management]
Theory and quantitative methods for characterizing arthropod population dynamics for research and pest management purposes. Course evaluates biological and climatic factors influencing population numbers, development, dispersal, and plant response to arthropod pests. Special topics include development of sampling methodology and simulation modeling.

[ENTOM 662 Insect Behavior Seminar]
Spring. 2 credits. Prerequisites: permission of instructor and either ENTOM 212 and BIONB 221 or equivalents. S–U grades optional. Offered alternate years. Not offered spring 1996 and 1998; next offered spring 1997. Hours to be arranged. M. J. Tauber.

ENTOM 672 Seminar in Aquatic Ecology
Spring. 1 credit. Prerequisites: permission of instructor or either ENTOM 456, 471 or BIONBS 261, 462. S–U grades optional. Offered alternate years. Not offered spring 1997; next offered spring 1996 and 1998. Hours to be arranged. B. L. Peckarsky.
Discussion and analysis of current topics in the ecology of streams, lakes and marine ecosystems, including student-generated synthesis of key papers in the literature.

ENTOM 685 Seminar in Insect Physiology
Spring. 1 credit. S–U grades optional. Prerequisite: permission of instructor. Offered alternate years. Not offered spring 1997; next offered spring 1996 and 1998. Hours to be arranged. Staff.
The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

ENTOM 707 Individual Study for Graduate Students
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Not for thesis research. Staff.

ENTOM 709 Teaching Entomology
Credit to be arranged. Staff.
Teaching entomology or for extension training.

ENTOM 800 Master's-Level Thesis Research
Credit to be arranged. Prerequisite: permission of instructor. S–U grades optional.

ENTOM 900 Doctoral-Level Thesis Research
Credit to be arranged. Prerequisite: permission of instructor. S–U grades optional. Staff.

Jugatae Seminar
Fall and spring.
A seminar conducted by Jugatae, the entomology club of Cornell University, to discuss topics of interest to its members and guests. All interested undergraduate and graduate students are encouraged to attend.
FOOD SCIENCE 73

Freehand Drawing and Scientific Illustration

Freehand Drawing and Scientific Illustration courses are offered through the Department of Floriculture and Ornamental Horticulture. Courses are described in the section "Freehand Drawing and Scientific Illustration."

Landscape Architecture

The Landscape Architecture Program at Cornell is sponsored by the College of Agriculture and Life Sciences through the Department of Floriculture and Ornamental Horticulture, and the College of Architecture, Art, and Planning. For course descriptions, see Landscape Architecture.

FOOD SCIENCE


Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

FOOD 101 Science and Technology of Foods

Fall. 1 credit. S-U grades only. F 1:20-1:10. J. Hotchkiss and staff. This course explores the application of science and technology to foods. Lectures will elucidate the role of engineering, biotechnology, chemistry, biochemistry, nutrition, toxicology, and microbiology in supplying the world with safe and nutritious food. An overview of food science as a discipline and career choice will be given.

FOOD 102 Contemporary Perspectives in Food Science

Spring. 1 credit. S-U grades only. F 12:20. Three field trips, 2 on F 1:25-5:00 and one on F 7:30 a.m.-5:30. R. A. Ledford. A series of seminars dealing with current regulatory, technical, and international developments in food science. Field trips to four or five commercial food plants will be used to illustrate the application of current technologies.

FOOD 150 Food Choices and Issues

Spring. 2 credits. S-U grades optional. T R 12:20. R. B. Gravani and D. D. Miller. This course provides Cornell students with the knowledge necessary to make healthy food choices. A systematic or holistic approach to food production, processing, distribution, and consumption will be presented. Topics include relationships between food, diet and health; food processing, food safety; and discussions of contemporary issues relating to food quality, safety, and nutritional value.

FOOD 200 Introductory Food Science

Fall. 3 credits. M W F 11:15-12:05. J. Hotchkiss. 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 biological, chemical, and physical properties; processing; nutrition; and food quality are stressed.

FOOD 210 Food Analysis

Spring. 5 credits. Prerequisite: CHEM 104 or 208. Lecs. M W 12:20; lab, F 12:20-3:20. J. W. Sherbon. Introduces tests used by food analysts for fats, proteins, carbohydrates, and selected minor nutrients. Emphasis is on understanding and use of good analytical techniques, including gravimetric, spectrophotometric and spectrophotometric methods. A special project for the total analysis of a complex food provides experience in technique selection, work scheduling, and execution.

FOOD 290 Meat Science (also Animal Science 290)

Fall. 2 or 3 credits. Lecs, T R 11:15-12:05 p.m.; lab, M or R 12:20-3:20. D. H. Beerman. An introduction to meat science through a study of the structure, composition, and function of muscle and its conversion to meat. Properties of fresh and processed meat, microbiology, preservation, nutritive value, inspection, and sanitation are also studied. Laboratory exercises include anatomy, meat-animal slaughtering, cutting, wholesale and retail cut identification, processing, inspection, grading, quality control, and meat merchandising. An all-day field trip to commercial meat plants is taken.

[FOOD 311 Milk and Frozen Desserts]

Fall. 2 credits. Prerequisite: FOOD 322 or permission of instructor. Offered alternate years. Not offered 1995-96; next offered fall 1996 and 1998. R. A. Ledford. Deals with the principles and practices of processing fluid milk products and frozen desserts. The chemical, microbiological, and technological aspects of processing these dairy products are considered. Emphasis will be upon product quality and recognition of factors affecting it.

FOOD 321 Food Engineering Principles

Fall. 3 credits. Prerequisites: FOOD 200 and Introductory Physics. M W F 9:05-9:55. S. S. H. Rizvi. Introduces the engineering principles underlying food processes and equipment. Topics covered include thermodynamics, mass and energy balance, fluid mechanics, and heat and mass transport.

FOOD 322 Food Engineering Laboratory

Spring. 2 credits. Prerequisite: FOOD 321. Lab, T or W 1:25-4:00; disc, T 12:20. S. S. H. Rizvi and G. Houghton. Provides hands-on experience with food engineering processes and measurements. Topics covered include mass and energy balances, rheology, fluid mechanics, heat transfer, refrigeration and psychrometry.

FOOD 331 Statistical Quality Control of Food Processing

Spring. 1 credit. Prerequisite: AG EC 310 or equivalent. Lab, T 1:25-4:25. J. M. Regenstein. An introduction to the statistical tools used to control quality in food processing operations. Topics covered include control charts and other process control tools as well as acceptance sampling.

FOOD 351 Milk Quality

Spring. 1 credit. Prerequisite: AN SCI 350 or equivalent or permission of instructor. F 12:20. D. K. Bandler. Focuses on the important aspects of farm sanitation and milk handling as they affect milk flavor and quality. The course is an overview of quality control tests, basic microbiology, cleaning and sanitizing, and special problems in manufacturing and marketing fresh and storable dairy products.

FOOD 394 Food Microbiology Lectures

Fall. 2 credits. Prerequisites: BIOM 290 and 291. M W 12:20-1:10. R. A. Ledford. The major families of microorganisms of importance in foods are studied, with emphasis on the roles of those organisms in food preservation, food fermentations, and public health.

FOOD 395 Food Microbiology Laboratory

Fall. 2 credits. Graduate students must have permission of the instructor. M W 2:00-4:25. J. M. Brown. Work includes study of the physiological characteristics of representative food microorganisms, practical use of general and special methods for microbiological testing and control of food products, and practice in the application of a systematic approach to controlling the safety of foods.

[FOOD 396 Food Safety Assurance]

Spring. 2 credits. Prerequisite: FOOD 200 or permission of instructor. Offered alternate years. Not offered 1995-96; next offered spring 1997. T R 9:05-9:55. R. B. Gravani. This course provides information on procedures to control biological, chemical, and physical hazards and assure the safety of foods. Topics include discussions on Hazard Analysis Critical Control Point (HACCP) programs, total quality management, and the application of current technologies in reducing the incidence of foodborne illnesses. Case studies and exercises will be used to demonstrate and apply the key principles that are discussed.

FOOD 400 Senior Seminar in Food Science and Technology

Fall. 1 credit. Limited to seniors. M W 4:30-5:20. D. D. Miller. Students prepare and present a seminar on a topic of current interest in food science and technology.

[FOOD 401 Concepts of Product Development]

Spring. 2 credits. Prerequisite: FOOD 200 or equivalent. Offered alternate years. Not offered 1995-96; next offered spring 1997 and 1998. Lecs. M W 12:20-2:15; lab, M 3:20-4:25. J. M. Regenstein. Introduction to the principles and practices related to managing wastes from food plants through reduction, reuse, recycling, and composting. Some broader areas of waste management impacting the food industry will
also be discussed. Includes field trips which may take all afternoon.

**FOOD 406** Cheese and Other Fermented Foods  
Principles and methods of fermentation and processing techniques as they apply to cheeses, cultured dairy foods, beers, and related products. Labs will feature unit processes and tastings.

**FOOD 409** Food Chemistry  
Spring. 3 credits. Prerequisite: BIOBM 330 or 331. M W F 9:05-10:40. D. D. Miller and staff.  
The chemistry of foods and food ingredients. Chemical and physical properties of water, proteins, lipids, carbohydrates, and other food components/additives are discussed in the context of their roles in foods. The effects of chemical changes during processing and storage on quality and nutritional aspects of several food commodity groups (milk, meat, fruits and vegetables, cereals and legumes) are described.

**FOOD 410** Sensory Evaluations of Foods  
Fall. 3 credits. Prerequisite: statistics. M W F 10:10-11:00. H. T. Lawless.  
Deals with the sensory techniques used in evaluating the flavor, color, and texture of foods and the evaluation of consumer acceptance. Includes methods for measuring these qualities, underlying psychological principles, statistical methods for analyzing results, and establishing a full-service sensory evaluation program.

**FOOD 415** Principles of Food Packaging  
Spring. 3 credits. M W F 11:15-12:05. J. H. Hotchkiss.  
The chemical and physical properties and manufacture of the basic materials used to construct packaging are discussed. The influence of packaging on shelf life is presented. Emphasis is on newer packaging technologies and materials. Economics, distribution, packaging, and spoilage; and quality and storage stability are also considered.

**FOOD 416** Food Packaging Laboratory  
A laboratory course designed to introduce several testing methods used to evaluate adequacy of food packaging. Emphases are on physical testing methods of packaging materials and the evaluation of total packages. Students will design and build a new food package.

**FOOD 417** Sensory Analysis of Dairy Products  
A survey of the traditional quality grading techniques used for sensory evaluation of dairy products, and a comparison of those techniques to alternative sensory evaluation procedures. Students will prepare samples for one or two demonstrations of classical dairy defects such as lipid oxidation or hydrolytic rancidity. Tasting and practice in identifying defects will be given in class. Primary attention will be given to sensory quality factors in fluid milk, cheddar cheese, cottage cheese, and ice cream.

**FOOD 419** Food Chemistry Laboratory  
A laboratory course emphasizing fundamental chemical, physical, and sensory techniques necessary for an understanding of the chemistry of foods. Relationships between chemical composition and functional, nutritional, and organoleptic properties of foods are strongly emphasized. Many of the laboratory techniques involved are common to those used in biochemistry laboratories (e.g., electrophoresis, chromatography, enzyme assays) but are applied to specific foods or beverages.

**FOOD 422** Food Engineering II  
Spring. 3 credits. Prerequisite: FOOD 321 or permission. Offered alternate years. Not offered 1995-96; next offered spring 1997 and spring 1999.  
Application of transport phenomena to food processing unit operations. Fundamentals of food process design, scale up, and control.

**FOOD 423** Unit Operations in Food Manufacturing  
An integrated approach to understanding food manufacturing operations. Topics include major unit operations used for thermalization, freezing and dehydration of foods. Emphasis is placed on the interplay between engineering design of processes and the physical and chemical transformations that occur as food is produced from various commodities. The impact of process conditions on product safety, overall quality, and storage stability are also considered.

**FOOD 430** Understanding Wine  
Spring. 3 credits. Prerequisites: Introductory biology and chemistry or permission of instructor. Students must be 21 years old by the first day of class (Jan. 22, 1996) to enroll. T 2:30-4:25. T. Henick-Kling, T. E. Acree, and H. T. Lawless.  
An introduction to wine appreciation through the study of fermentation biology, wine composition, and sensory perception. Samples of wines will be used to illustrate the sensory properties, microbiological processes, and chemical components that determine wine quality. Students will learn to recognize the major features of wine that determine sensory quality and know the processes that produced them. Topics will include the psychology and chemistry of bouquet, taste, and aroma; the microbiology of fermentation and spoilage; and the sensory properties of wines from different grape varieties, viticultural practices, and wine making techniques.

**FOOD 437** International Postharvest Food Systems  
Fall. 2 or 3 credits. Prerequisite: freshman chemistry. S-U grades optional. T 10:10-11:00. M. G. Bourne and staff.  
An interdisciplinary course designed for all undergraduate and graduate students in ALS. Describes postharvest food losses and methods to reduce the loss. Topics include storage and care of unprocessed and minimally processed foods such as cereal grains, fruits, vegetables, tubers, and fish; biology and control of fungi, insects, and vertebrates in foods; chemical causes of quality loss; effects of climate; and economic and social factors affecting food preservation and storage. Emphasis is given to the problems in developing countries. The third credit requires a written case study of a country or commodity.

**FOOD 450** Fundamentals of Food Law  
Introduction to the complex array of federal and state statutes and regulations that control the processing, packaging, labeling, and distribution of food, including aspects of safety and nutritive value. Emphasis will be on the Food and Drug Administration and U.S. Department of Agriculture regulations, but the course also will refer to other regulatory agencies. Emphasis will be placed on how a food or agricultural professional interacts with this legal system.

**FOOD 456** Advanced Concepts in Sensory Evaluation  
Readings and discussions of primary source materials in sensory evaluation, including historical perspectives, psychophysics, perceptual bases, human information processing. Concepts influencing detection of sensory differences, use of rating scales, and characterization of sensory properties will be emphasized.

**FOOD 490** Commercial Meat Processing (also Animal Science 490)  
Spring. 2 or 3 credits. Lees, T R 9:05, lab T 1:25-4:25. Field trip to commercial meat processing plants. D. H. Beerman.  
A study of the classification, formulation, and production of commercially available processed meat products. Physical and chemical characteristics of meat and nonmeat ingredients; their functional properties; various processing methodologies; microbiology; packaging, handling, and storage, and quality assurance are discussed.

**FOOD 494** Special Topics in Food Science  
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee; and the same course will not be offered more than twice under this number.

**FOOD 497** Individual Study in Food Science  
Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional.  
May include individual tutorial study, a special topic selected by the student 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.
There have been great advances in applying A detailed study of milk constituents and their endotoxins, will be discussed. In addition, other approaches, including especially as they concern food safety. In the course will be to review the recent developments in the theory and application of nucleic acid and antibody-based detection systems, especially as they concern food safety. In addition, other approaches, including measurement of immunity, ATP, and endotoxins, will be discussed.

FOOD 498 Undergraduate Teaching Experience
Fall or spring. 3 credits maximum. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades only. Students assist in teaching a course appropriate to their previous training. Students will meet with a discussion or laboratory section and will regularly discuss objectives with the course instructor.

FOOD 499 Undergraduate Research in Food Science
Fall or spring. 4 credits maximum. S-U grades optional. Students must register with an Independent Study form (available in 140 Roberts Hall). Students conduct original research directed by a food science faculty member.

FOOD 600 Seminar
Fall or spring. 1 credit. Required of all food science graduate students. S-U grades only. T 4:30-5:20.

FOOD 604 Chemistry of Dairy Products
Fall. 2 credits. Limited to 16 students. Prerequisites: organic chemistry, biochemistry, knowledge of dairy-product manufacturing procedures, and permission of instructor. Offered alternate years. Not offered 1995-96; next offered fall 1996. F 1:25-3:30. D. M. Barbano. A detailed study of milk constituents and their properties. Properties of various milk constituents are related to observed physical and chemical changes that occur in dairy products during and after processing. This course will stimulate current research in dairy chemistry.

FOOD 605 Physical Chemistry of Food Components
Fall. 3 credits. Prerequisite: an undergraduate course in physical chemistry. Offered alternate years. Not offered 1995-96; next offered fall 1996. M W F 10:10. J. W. Brady. This course will cover the physical properties of food molecules. Emphasis will be placed on the molecular basis of structural characteristics, colloidal properties, molecular interactions; foams, gels, and water binding of foods.

FOOD 607 Advanced Food Microbiology
Spring. 2 credits. Prerequisites: food microbiology, genetics (preferred). Offered alternate years. Not offered 1996-97; next offered spring 1996. M W 11:15. C. A. Batt. There have been great advances in applying the modern tools of molecular biology to the detection of microorganisms and their metabolites. The primary emphasis of this course will be to review the recent developments in the theory and application of nucleic acid and antibody-based detection systems, especially as they concern food safety. In addition, other approaches, including measurement of immunity, ATP, and endotoxins, will be discussed.

FOOD 618 Flavors—Analysis and Applications
Spring. 2 credits. S-U grades optional. Offered alternate years. Not offered 1995-96; next offered spring 1997. Loc, F 1:25, disc, P 2:30. H. T. Lawless and T. Acree. An advanced course in sensory and instrumental analysis of flavors, flavor chemistry, and flavor applications in foods for food scientists and those in related fields concerned with human food perception and consumption. The course will survey taste, aroma, and volatile flavors, and trigeminal stimuli from the perspectives of chemical structures, methods of analysis, uses and interactions in food systems, and consumer acceptance.

FOOD 620 Food Carbohydrates (also Nutritional Sciences 620)
Spring. 2 credits. Limited to qualified seniors and graduate students. Prerequisite: BIOBM 330 or equivalent. Offered alternate years. Not offered 1996-97; next offered spring 1996. T R 10:10. B. A. Lewis and J. W. Brady. A consideration of the chemistry of carbohydrates, including sugars, starches, pectins, hemicelluloses, gums, and other complex carbohydrates. Emphasis is on the intrinsic chemistry and functionality in food systems and the changes occurring during food processing and storage.

FOOD 655 Engineering Properties of Foods
Spring. 2 credits. Prerequisite: course in transport processes or unit operations as applied to foods, or permission of instructor. Offered alternate years. Not offered 1995-96; next offered spring 1997. T R 12:20-1:10. S. S. H. Rizvi and S. J. Mulvany. Theories and methods of measurement and prediction of rheological, thermal, and mass transport properties of foods and biomaterial systems. Emphasis is on physical-mathematical basis of measurement as well as the prediction processes. Examples of appropriate use of these properties in engineering design and analysis of food processes will also be provided.

FOOD 664 Special Topics in Food Science
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and the same course will not be offered more than twice under this number.

FOOD 688 Graduate Teaching Experience
Fall or spring. 1 to 3 credits. S-U grades only. Staff. Designed to give graduate students teaching experience through involvement in planning and teaching courses under the supervision of field faculty members. The experience may include leading discussion sections; preparing, assisting in, or teaching lectures and laboratories; and tutoring. There will be assigned readings and discussion sessions on educational theory and practice throughout the term.

FOOD 800 Masters-Level Thesis Research
Fall or spring. Credit to be arranged. Maximum credit, 12. Prerequisite: limited to master's candidates, permission of Special Committee Chair. S-U grades only. Graduate faculty.
**FR DR 316 Advanced Drawing**
Fall or spring. 2 credits. Prerequisite: FR DR 109, 211 or permission of instructor. S-U grades optional. 6 hours to be arranged. R. J. Lambert.
For students who want to attain proficiency in a particular type of illustration or technique.

**FR DR 417 Scientific Illustration**
Fall. 2 credits. Prerequisite: FR DR 211 or 316 or equivalent. S-U grades optional for graduate students only. Not offered 1995–96.
A survey of methods of illustration. Training in techniques of accurate representation in media suitable for reproduction processes, including pen and ink, scratchboard, wash, and mixed media.

**FRUIT AND VEGETABLE SCIENCE:**

**HORTICULTURAL SCIENCE**
See Horticultural Sciences.

**HORTICULTURAL SCIENCES**
Horticultural science courses at Cornell are taught by the faculty of the Department of Fruit and Ornamental Horticulture and the Department of Fruit and Vegetable Science.

**Fioriculare and Ornamental Horticulture**

**Courses by Subject:**

General horticulture: 101, 102
Crop production
Agroforestry: 415
Controlled Environment Agriculture: 410, 411, 412, 413
Fruit: 200, 442, 444, 445, 450
Greenhouses: 410, 411, 412, 413
Nursery: 400, 402
Turfgrass: 430, 475
Vegetable: 225, 456, 460
Extension education: 629
Horticultural physiology: 400, 450, 455, 456, 460, 615, 620
Independent study, research, and teaching: 470, 495, 496, 497, 498, 499, 500, 605, 700, 800, 900
Internships: 496
Landscape architecture (professionally accredited program)
Landscape horticulture: 435, 440, 491
Landscape architecture: 142, 291, 310, 312, 480, 491
Plant materials: 230, 243, 300, 301, 335, 430

Plant propagation: 400
Postharvest physiology: 325, 625, 630
Sales and service businesses: 425
Seminars: 495, 602, 630, 636
Special topics: 470, 494, 629, 630, 635, 694
Turfgrass management: 330, 475
Vegetable types and varieties: 220, 465

**Note:**
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**HORT 101 Introduction to Horticultural Science**
An introduction to horticulture in all of its components: floriculture, landscape horticulture, turfgrass management, fruit and vegetable science, and related professional and commercial fields. Emphasis is on the history, geography, and literature of the field; the structure and organization of the component industries, institutions, and professions, and the role of science and technology in the continuing development of horticultural practice. Field trips, including one three-day field trip (cost approximately $150.00), are taken to horticultural firms, institutions, and historic sites.

**HORT 102 General Horticulture**
Spring. 4 credits. Each lab limited to 25 students. Lecs. M W F 10:10, lab M T or W 2–4:25, L. D. Topoleski.
Acquaints the student with applied and basic horticulture. Open to all students who want a general knowledge of the subject or who want to specialize in horticulture but have a limited background in practical experience or training in plant science. Includes flower, fruit, and vegetable growing and gardening techniques.

**HORT 200 Introductory Pomology**
A survey of fruit science, emphasizing the natural history, botany, physiology, and production of edible fruits in temperate-climate areas. Topics include varietal breeding and propagation, environmental and sustainable agricultural and practical methods of fruit production. Labs and field trips will provide hands-on experience and tours of regional orchards.

**HORT 220 Vegetable Types and Identification**
Fall. 2 credits. T 2–4:25. L. Topoleski.
Acquaints students with the vegetable species grown in the Northeast and the pests and disorders encountered in their production. Subjects covered include identification of economically destructive weeds, diseases and insects of vegetable crops, identification of vegetable and weed seeds, seedlings, nutrient deficiencies, vegetable judging, grading, and grade defects.

**HORT 225 Vegetable Production**
Intended for those interested in the production, processing, and marketing of vegetables. Topics included are techniques, problems, and trends in the culture, harvesting and storage of the major vegetable crops. Field trips to conventional and organic farms and hands-on experience in growing vegetables in the laboratory are included.

**HORT 230 Woody Plant Materials**
A study of the trees, shrubs, ground covers, and vines used in landscape plantings. Emphasis is on winter identification and values for use as landscape material.

**HORT 243 Taxonomy of Cultivated Plants (also BIOL 243)**
Fall. 4 credits. Prerequisite: One year of introductory biology or written permission of instructor. May not be taken for credit after BIOL 248. Not offered 1995–96; next offered 1996–97. M. A. Luckow.
An introduction to the identification of ferns and seed plants with an emphasis on cultivated families and genera. Lectures will cover the principles and methods of systematics, basic rules of nomenclature, and relationships among families, all in the context of cultivated plants. Laboratories will teach sight identification of important plant families and identification of unknowns using analytic keys.

**HORT 300 Garden and Interior Plants I**
A study of ornamental plants used in garden and interior situations. The first seven weeks cover primarily herbaceous annuals and perennials, with the laboratory devoted to various practical gardening activities. The remainder of the semester covers the major kinds of foliage and flowering plants used in the home and in other interior landscape situations. Emphasis is on identification, use, and general cultural requirements.

**HORT 301 Garden and Interior Plants II**
Spring. 3 credits. Prerequisite: HORT 300 or permission of instructor. Fee for lecture-laboratory manual: $35. Lecs., M W 11:15; lab, M 2–4:25. R. G. Mower.
A continuation of Horticultural Sciences 300. The first seven weeks are devoted to a further study of interior plants, with emphasis on specialized groups of plants such as orchids, cacti and succulents, gesneriads, ferns, palms, and bromeliads. The second seven weeks are devoted to outdoor herbaceous plants, such as tulips, daffodils, crocuses, and irises, as well as other spring-blooming bulbs and perennial plants. Outdoor laboratories emphasize practical gardening activities appropriate to the spring season.

**HORT 325 Practical Aspects of Postharvest Handling of Horticultural Crops**
A study of changes that occur in horticultural crops between harvest and consumer. Practices that affect the rate of change and the final effect on quality of the commodity are discussed. Maturity/quality indices, preharvest treatments, and harvesting/handling practices and storage/transportation requirements of selected horticulture crops are covered.

**HORT 330 Turfgrass Management**
Study of the scientific principles involved in the management of golf courses, athletic fields, parks and industrial grounds, and...
commercial sod production. Considerations given to principles of establishment, mowing, irrigation, growth and development, species selection, and nutrition in the management of turfgrass sites.

HORT 335 Woody Plant Materials for Landscape Use
Fall. 3 credits. Limited to 30 students. Primarily for landscape architecture majors. Fee for lecture-laboratory manual, $35. Lecs, M W F 9:05; lab R 1:25-4:25. R. G. Mower. A study of the trees, shrubs, vines, and ground covers used in landscape plantings in the northeastern United States. Emphasis is on leaf identification and on characteristics that determine the usefulness of each as landscape subjects.

HORT 400 Principles of Plant Propagation
Fall. 3 credits. Prerequisites: BIOLP 242 and 244 or another course in plant physiology. Lecs, T R 9:05; lab, R 1:25-4:25. K. W. Mudge. Sexual (sexual) propagation of both vegetative (asexual) propagation including cutting, graftage, tissue culture, layering and specialized vegetative reproductive structure. Physiological, environmental, and anatomical principles are stressed in lecture and hands-on experience in laboratories. Examples include both temperate as well as tropical horticulture, agronomic, and forestry crops.

HORT 410 Principles of Controlled Environment Agriculture (CEA)
Spring. 3 credits. Prerequisite: permission of instructor. 3-day field trip required. Cost of field trip: $80+. Lecs, T R 10:10-12:05. T. C. Weiler. Basics and issues related to managing agricultural production in environmentally optimized facilities. Survey of CEA as an agricultural alternative, technology basics, systems and practices; world centers of production, structures, systems and equipment, materials handling, heating and cooling, lighting, fertilizing and irrigation, environmental stewardship, integrated pest management, business management, and human resource management.

HORT 411 Principles of Crop Production in Controlled Environments
Spring. 3 credits. Prerequisites or corequisite: HORT 410. Two afternoon field trips required. Lecs, W F 8:00; lab R 2-4:25. T. C. Weiler and staff. Study of several controlled-environment agriculture (CEA) crops; including cut, pot and bedding ornamentals, vegetables and fruits briefly covered; emphasis on predictive harvesting through environmental, physical, and chemical management of growth and development. Each student will grow one or more crops.

HORT 412 Case Studies of Controlled Environment Agriculture (CEA)
Spring. 1 credit. Prerequisite or corequisite: HORT 410. Lab 3 hours per week as scheduled. R. W. Langhans. Analysis of actual CEA enterprises regarding adoption of technology, crop culture, operations management, and/or marketing.

HORT 413 Computer-Assisted Management in Controlled Environment Agriculture (CEA)
Spring. 1 credit. Prerequisite or corequisite: HORT 410. Lab 3 hours per week as scheduled. R. W. Langhans. Application of computer software to operations management and environmental management of a facility— including specifications for facilities, optimization of resource inputs (e.g., energy, fertilizer), crop programming, efficient space use, labor efficiency (time and motion), and inventory management.

HORT 415 Principles and Practices of Agroforestry (also NTREES 415)
Spring. 2 credits. Prerequisites: senior or graduate standing or permission of instructor. S.U. option. Lecs, W 10:10; lab, 1:25-4:25. K. W. Mudge, J. P. Lassio. An introduction to modern and traditional agroforestry systems involving the spatial and temporal integration of multipurpose woody plants (trees and/or shrubs) with annual or perennial crops and/or with livestock. Interactions between woody and non-woody components of agroforestry systems will be considered from the standpoint of above and below ground resource capture. The sustainability of agroforestry systems will be critically examined from both a biophysical and socioeconomic perspective. Laboratory sessions will include field trips, case studies, use of computer-based sources of information, and practical skills involved in woody plant management (identification, propagation, planting, pruning, measurement.)

HORT 420 Principles of Nursery-Crop Production
Fall. 4 credits. Prerequisites: HORT 400. Lecs, M W F 9:05; lab, M 2-4:25. Field trips. G. L. Good. Principles of commercial production of nursery crops to marketable stage, including postharvest handling and storage. Term project required. Field trips are made to commercial nurseries.

HORT 425 Horticultural Sales and Service Businesses
Spring. 3 credits. Fee for course manual $35. Prerequisites: ARME 240 or permission of instructor. Lecs, T R 9:05; lab, M 1:25-4:25. G. L. Creasy. Grape production and post-production practices with emphasis on the Great Lakes and Finger Lakes regions. We will examine grape varieties, site selection, and viticultural management as affected by geography, meteorology and vine anatomy/physiology. Protection of vines and grapes from injury by cultural, chemical, and natural means will also be explored. Laboratory exercises and field trips offer hands-on experience in vineyard production, marketing and processing.

HORT 426 Applied Viticulture
Fall. 3 credits. Offered fall 1995. Lecs, M W F 10:10; lab, R 1:25-4:25. L. L. Creasy. The science of tree fruit production in temperate climates, including site evaluation and improvement, fruit variety and rootstock selection, tree propagation, pruning and training, and integrated pest management. Emphasis is on agroecological principles and hands-on practices in orchard lab-sessions and field trips.

HORT 435 Landscape Management
Fall. 4 credits. Prerequisites: HORT 230 or 335, and BIO PL 241 or permission of instructor. Lecs, M W F 12:20; lab, T 1:25-4:25. D. A. Rukst. A study of the practices involved in the planting and maintenance of woody ornamental plants in the landscape. Major emphases will be on planting and post-planting techniques, water and fertilization management, pruning, and general tree care. The lectures will focus on the physiological bases for essential management principles. Labs have a hands-on focus.

HORT 440 Restoration Ecology
Fall. Weeks 1–10. 3 credits. Prerequisite: upper division or graduate standing. Letter grade only. Lecs, T R 10:10; lab, F 1:00–4:30. T. H. Whitlow. An inquiry-based treatment of the principles and methods of ecology, conservation biology, hydrology, soil science and related disciplines applied to restoration of degraded terrestrial ecosystems. Weekly labs, four weekend field trips, and a semester-long project provide many opportunities for experiential learning. Substantial commitment outside of the classroom is expected.

HORT 442 Small Fruits
Fall. 3 credits. Offered even years. Not offered 1995–96. Lecs, M W F 9:05; lab, M 1:25-4:25. M. P. Pritts. A study of the evolution, breeding history, and physiology of strawberries, raspberries, blackberries, blueberries, and other minor small fruit crops, and of cultural practices that influence productivity, fruit quality, and pest damage. Marketing and economics will be considered, and alternative production practices for both commercial and home gardeners will be discussed.

HORT 444 Applied Viticulture
Fall. 3 credits. Offered fall 1995. Lecs, M W F 9:05; lab, R 1:25-4:25. L. L. Creasy. Grape production and post-production practices with emphasis on the Great Lakes and Finger Lakes regions. We will examine grape varieties, site selection, and vineyard management as affected by geography, meteorology and vine anatomy/physiology. Protection of vines and grapes from injury by cultural, chemical, and natural means will also be explored. Laboratory exercises and field trips offer hands-on experience in vineyard production, marketing and processing.

HORT 445 Orchard Management
Spring. 3 credits. Prerequisite: HORT 200. S-U grades optional. Offered every year. Not offered 1995. Lecs, T R 10:10; lab T 1:25-4:25. I. A. Merwin. The science of tree fruit production in temperate climates, including site evaluation and improvement, fruit variety and rootstock selection, tree propagation, pruning, training, and integrated pest management. Emphasis is on agroecological principles and hands-on practices in orchard lab-sessions and field trips.
HORT 450 Soil Management and Nutrition of Perennial Crops
Fall. 3 credits. Prerequisite: any college-level chemistry course. Lecs, M W 10:10; lab/disc, M 2-4:25. Not offered fall 1995.
The course deals with both major, secondary and minor elements including fertilization programs, interpretation of tissue and soil analyses, nutrient interactions, induced deficiencies, toxicities as well as the effects of organic matter, crop residues, and specific crop sequences. The course emphasizes hands-on field and greenhouse experiments and small group discussions.

HORT 455 Fertility Management and Nutrition of Vegetable Crops
Fall. 3 credits. Prerequisite: any college-level chemistry course. Lecs, M W 10:10; lab/disc, M 2-4:25. Not offered fall 1995. 
Topics selected for each term will change from year to another and reflect the expertise and research interests of the professors who participate. Topics selected for each term will be announced several months before the term begins.

HORT 475 Golf Course Management
Fall. 2 credits. Prerequisite: HORT 330 or equivalent. Offered odd years fall: 1995, fall 1997.

HORT 491 Design and Plant Establishment (also LA 491)
Fall. 3 credits. Prerequisites: FOH 230 or permission of instructor. Lecs, T R 12:20-2:20; studio, R 1:25-4:25; N. L. Bassuk and P. J. Trowbridge. This course will focus on the establishment of woody and herbaceous plants in urban and garden settings. By understanding the special constraints placed on plants, we will be able to critically assess and modify potential planting sites, select appropriate trees, shrubs, and ground covers for a given site, and learn about the principles and practices of plant establishment both in the ground and in contained environments. Design followed by specifications and graphic details will be produced to implement these practices. Techniques for tree preservation and land reclamation/revegetation will also be discussed. Field work includes chemical and physical analysis of soils, vegetation, and site assessment.

HORT 494 Special Topics in Horticulture
Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged.

HORT 495 Undergraduate Seminar in Horticultural Sciences
Undergraduate participation in weekly departmental seminar series. May be taken four times for one credit per semester. S-U grades only.

Section 1: Current topics in Fruit and Vegetable Science (see Hort 602).
J. A. Merwin. Fall or spring. 1 credit. R4, 1-2 credits.
Graduate students should enroll in HORT 602.

Section 2: Current topics in Floriculture and Ornamental Horticulture, (see HORT 636, Section 2).
R 12:20. T. C. Weiler Fall.
Graduate students in Floriculture and Ornamental Horticulture should enroll in HORT 636.

HORT 496 Internship in Horticultural Sciences
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of student's adviser in advance of participation in internship programs. Students must register with an Independent Study form (available in 140 Roberts Hall) signed by the faculty member who will supervise their study and assign their grade. Hours to be arranged.

HORT 497 Independent Study in Horticultural Sciences
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of instructor(s). Students must register with an Independent Study form (available in 140 Roberts Hall.)

HORT 498 Undergraduate Teaching Experience
Fall or spring. Credit variable. S-U grades optional. Prerequisites: previous enrollment in course to be taught or equivalent, and written permission of the instructor.

HORT 499 Undergraduate Research Experience
Fall or spring. Credit variable. S-U grades optional. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall.) Hours to be arranged.

HORT 500 Master of Professional Studies (Agriculture) Project
Fall or spring. 1-6 credits. (6 credits maximum toward MPS [Agriculture] degree). S-U grades optional. Staff.
A comprehensive project emphasizing the application of principles and practices to professional horticultural teaching, extension, and research programs and situations.

HORT 602 Seminar in Fruit and Vegetable Science
Fall or spring. 1 credit. S-U grades only.

HORT 615 Quantitative Methods in Horticultural Research
Spring. 3 credits. Prerequisites: BIOPL, BIOM, 331, CHEM 357, or equivalent, or permission of instructor. Offered spring 1997.

HORT 620 Woody Plant Physiology
Spring. 4 credits. Prerequisites: BIOPL, BIOM, 331, CHEM 357, or equivalent, or permission of instructor. Offered spring 1997.
A detailed study of physiological processes in woody plants and how these processes influence fruit quality. Topics will include shoot and root growth, photosynthesis, dormancy, photoperiodism, photosynthesis, respiration, carbon and nitrogen metabolism, water relations, and fruiting. Several faculty members participate in teaching.

HORT 625 Advanced Postharvest Physiology of Horticultural Crops
Spring. 3 credits. Prerequisite: BIOP 242 and/or HORT 325. Offered alternate years. Next offered spring 1996. Lecs, T R 10:10-10:55.

Physiological and biochemical aspects of fruit physiology, ripening, and senescence of harvested horticultural plant parts. Topics include morphological and compositional changes during ripening and storage life, and physiological disorders, aspects of hormone action and interactions, and a consideration of control.

HORT 629 Special Topics in Plant Science Extension (also Plant Breeding 629)
Spring. 2 credits. Offered alternate years. F 10:10-12:05, W. D. Pardee.

Designed for graduate students and advanced undergraduates to provide a broader knowledge of cooperative extension philosophy and methods. Developed to support student interest in expansion and research in public and commercial organizations. Topics relate to extension in other countries as well as in the United States.

HORT 630 Current Topics in Postharvest Horticulture
Spring. 1 credit. Prerequisite: permission of instructor. Hours to be arranged. C. B. Watkins.

Graduate students and staff report and discuss current topics in postharvest biology and technology of horticultural crops.

HORT 635 Tools for Thought
Fall. 1 credit. Open to graduate students only. S-U grades only. 1 hour per week, to be arranged. T. H. Whitlow.

A survey of the philosophy of science, hypothesis testing, approaches to experimental design, experimental hierarchies, methods of data reduction, the interaction between basic and applied research and the role of reductionism in the applied plant sciences. This course is intended to assist newer graduate students make the intellectual transition from taking prescribed courses to conducting independent original research. Readings include Kuhn’s The Structure of Scientific Revolutions. Discussion and critiques of assigned readings.

HORT 636 Current Topics in Horticulture
1 credit. S-U grades only.

Section 1: Fruit and Vegetable Science
J. A. Merwin. Fall or spring. 1 hour per week, to be arranged. A seminar series on current topics chosen by participating students and faculty, on a rotating basis. Format consists of weekly discussion groups, with each participant presenting at least one oral report based on independent reading or experimentation relating to the chosen topic. Interested students should contact the designated instructor(s) for each term.

Section 2: Floriculture and Ornamental Horticulture
T. C. Weiler and staff. Fall. 1 hour per week, to be arranged. Graduate students only. Undergraduates should enroll in HORT 495 (Section 2). Each week a staff member will develop a dialogue with students on a topic of current mutual interest. Topics and discussion leaders change by week and semester; topics will encompass planting design, exterior and interior landscape management, turfgrass management, urban horticulture, nursery management, plant materials, stress physiology, weed science, root zone ecology, horticultural sales and service business orientation, and controlled environment agriculture. Brief reading assignments may be distributed for completion by the next class.

HORT 694 Special Topics in Horticulture
Fall or spring. 4 credits maximum. S-U grades optional. Hours to be arranged.

The department teaches “trial” courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the departmental committee, and the same course will not be offered more than twice under this number.

HORT 700 Graduate Teaching Experience
Fall or spring. Credit variable. Open only to graduate students. Undergraduates should enroll in HORT 498. S-U grades optional. Prerequisite: permission of instructor. Hours to be arranged.

Designed to give graduate students teaching experience through involvement in planning and teaching courses under the supervision of departmental faculty members. The experience may include leading discussion sections, preparing, assisting in, or teaching lectures and laboratories, and tutoring.

HORT 800 Thesis Research, Master of Science
Fall or spring. Credit to be arranged.

HORT 900 Thesis Research, Doctor of Philosophy
Fall or spring. Credit to be arranged.

INTERNATIONAL AGRICULTURE
Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

INTAG 403 Traditional Agriculture in Developing Countries

Today, perhaps over half of the world’s arable land is farmed by traditional farmers. They developed sustainable agriculture practices which allowed them to produce food and fiber for millennia with few outside inputs. Many of these practices have been forgotten in developed countries but are still used by many traditional, subsistence, or partially subsistence farmers in developing countries. The course will examine traditional systems from several disciplinary points of view.

INTAG 414 Cultivation and Improvement of Cereal Crops
Spring. 1 credit. Prerequisite: An introductory biology or crops course (BIO 101, HORT 102, SCAS 311 or equivalent) and SCAS/BIO G 473. Offered alternate years. Not offered 1995-96 and 1997-98; next offered 1996-97. M W F 11:15. J. E. Smith and staff.

An introduction to characteristics, culture, and improvement of important cereal crops of the tropics and subtropics, including agronomic, economic, and social aspects. Emphasizes maize and rice. Lectures feature slides and other illustrative material based on experiences in the tropics and discussion of current issues relating to tropical cereal crops. This is the first of three 1-credit modules, including INTAG 415 and INTAG 418; each taught for one-third of the semester.

INTAG 415 Cultivation and Improvement of Root, Tuber, and Plantain Crops

An introduction to tropical root, tuber, and plantain crops, their importance, their culture, and their food, feed, and industrial uses. The cultural and socio-economic role of these crops in tropical societies will be considered, as well as the negative and positive aspects of their production and utilization. This is one of three 1-credit modules, including INTAG 414 and INTAG 418, each taught for one-third of the semester.

INTAG 418 Horticultural Crops in the Tropics
Spring. 1 credit. Prerequisite: An introductory biology or crops course (BIO 101, HORT 102, SCAS 311 or equivalent) and SCAS/BIO G 473. Offered alternate years. Not offered 1995-96 and 1997-98; next offered 1996-97. M W F 11:15. J. A. Merwin, E. FIGUEROA, and C. Wien.

A survey of fruit and vegetable crops of economic and/or dietary importance in the tropics. The natural history of horticultural crops, major regions and methods of production, domestication, and cultivation systems, and various technological, ecological, and social factors that affect tropical fruit and vegetable production will be emphasized. This is one of three 1-credit modules,
including INTAG 414 and INTAG 416, each taught for one-third of the semester.

INTAG 599 International Agriculture and Rural Development Project Paper
Fall and spring. 1-6 credits. Limited to M.P.S. candidates in International Agriculture and Rural Development. S-U grades only. Staff.

INTAG 602 Agriculture in the Developing Nations
Spring. 3 credits. Prerequisites: INTAG 300 or equivalent, INTAG 402, and permission of instructors. Cost of field-study trip includes air fare and approximately $400 for lodging, meals, and personal expenses. T R 2:30-4:25 until midterm only. R. W. Blake. Oriented to provide students an opportunity to observe agricultural development in a tropical environment and promote interdisciplinary exchange among staff and students. The two-week field-study trip during January to Latin American countries is followed by discussions and assignments dealing with problems in agriculture and livestock production in the context of social and economic conditions.

INTAG 603 Administration of Agricultural and Rural Development (also Government 692)
Spring. 4 credits. M 2:30-5:00. N. T. Uphoff and staff. An intercollege course designed to provide graduate students with a multidisciplinary perspective on the administration of agricultural and rural development activities in developing countries. The course is oriented to students trained in agricultural and social sciences who are likely to have administrative responsibilities during their professional careers.

INTAG 650 Special Topics in International Agricultural and Rural Development
Fall or spring. 1-3 credits. Staff. A seminar for new themes of agricultural and rural development. Offered occasionally. Specific content varies.

INTAG 685 Training and Development: Theory and Practice (also Communication 685, Education 685 and Industrial and Labor Relations 685)
Spring and summer. 4 credits. S-U grades optional. Charge for materials $35. Rec. Fee: 9:05-12:05, lab. 1 hour per week, to be arranged. At Communication Graduate Center, R. Colle, M. Ewert, D. Desher. Analysis, design, and administration of training programs for the development of human resources in small-farm agriculture, rural health and nutrition, literacy as nonformal education, and general community development. Designed for scientists, administrators, educator-trainers, and social organizers in rural and agricultural development programs in the U.S. and abroad.

INTAG 703 Seminar for Special Projects in Agricultural and Rural Development
Fall and spring. 1 credit. Required for graduate students enrolled in the M.P.S. (Agr.) degree program and majoring in international agricultural and rural development; others with permission of the program director. S-U grades only. M 12:20-2:15. R. W. Blake and staff.

The seminar provides students with the opportunity to develop and present their special projects. It also serves as a forum for discussion of current issues in low-income agricultural and rural development, with particular attention to interdisciplinary complexities.

Related Courses in Other Departments
Sociotechnical Aspects of Irrigation (ABEN 754 and GOVT 644)
Introduction to Global Economic Issues (ARME 100)
International Trade Policy (ARME 430)
Economics of Agricultural Development (ARME 441)
The World's Food (ARME 660)
(Macro Policy in Developing Countries (ARME 763) Not offered 1995-96.)
Tropical Livestock Production (AN SC 400) Not offered 1995-96.
Tropical Forages (AN SC 403) Not offered 1995-96.
Southeast Asia Seminar: Country Seminar (ASIAN 601 and 602)
Plants and Civilization (BIOL 246)
Food, Agriculture, and Society (BIODE 469)
Seminars in International Planning (CRP 671)
Seminars in Project Planning in Developing Countries (CRP 675)
Intercultural and Development Communication (COMM 612)
Communication in the Developing Nations (COMM 624)
Planning Educational Systems (EDUC 678)
[Designing Extension and Continuing Education Programs (EDUC 681) Not offered 1995-96.]
Community Education and Development (EDUC 682)
International Postharvest Food Systems (FOOD 447)
Political Economy of Change: Rural Development in the Third World (GOVT 648)
International Environmental Issues (NTRRES 400)
Religion, Ethics, and the Environment (NTRRES 407)
National and International Food Economics (NS 457)
International Nutrition Problems, Policy, and Programs (NS 680)
International Nutrition Seminar (NS 689)
Special Topics in International Nutrition (NS 699)
Introduction to Plant Breeding (PL BR 201)
Plant Diseases in Tropical Agriculture (PL PA 655)
Rural Sociology and International Development (R SOC 205)
Comparative Issues in Social Stratification (R SOC 370)
[Gender Relations, Gender Ideologies, and Social Change (R SOC 425) Not offered 1995-96.]
Social Demography (R SOC 438)
[Population, Environment, and Development in Sub-Saharan Africa (R SOC 495) Not offered 1995-96.]
Contemporary Sociological Theories of Development (R SOC 606)
Land Reform, Old and New (R SOC 643)
[Social Movements in Agrarian Society (R SOC 723) Not offered 1995-96.]
The Political Economy of Policy and Planning in Third World States (R SOC 725) Not offered 1995-96.]
Production of Tropical Crops (SCAS 314) Fall 1995.
Properties and Appraisal of Soils of the Tropics (SCAS 471)
Ecology of Agricultural Systems (SCAS 473, and BIODE 473)

LANDSCAPE ARCHITECTURE

LA 141 Freehand Drawing
Fall. 3 credits. Limited to 25 students. S-U grades optional. Developing ability to freehand observation drawing. Freehand still life, landscape, figure, and perspective drawing will be included. Weekly sketchbook assignments.

LA 142 Introduction to Landscape Architecture
Spring. 4 credits. Limited to approximately 20 students; freshmen landscape architecture majors or permission of instructor. Cost of basic drafting equipment and supplies, about $200. Fundamentals of landscape design applied to residential and other small-scale site-planning projects. Work in the studio introduces course participant to the design process; design principles, construction materials, planting design, and graphics.

LA 201 Design, Composition and Theory
Fall. 6 credits. Limited to landscape architecture majors. Cost of basic drafting equipment and supplies, about $200; expenses for field trip, about $250. Basic design principles and processes applied to the design of the outdoor environment. Studio projects focus on the analysis, organization, and form of outdoor space through the use of three-dimensional components including structures, vegetation, and earthforms.

LA 202 Design, Composition and Theory
Spring. 6 credits. Prerequisite: LA 201 with a grade of C or better. Cost of supplies, about $200; expenses for field trip, about $250. Understanding the role of basic design, design theory, and design languages in landscape architectural projects.

LA 261 Urban Archaeology (also CRP 261)
Fall. 3 credits. Urban archaeologists study American Indian, colonial, and nineteenth-century sites which now lie within the boundaries of modern cities. This course explores how urban centers evolve; what lies beneath today's cities; and how various cultures have altered the urban landscape. Students will participate in a local archaeological excavation.

LA 282 The American Landscape
Spring. 3 credits. An interdisciplinary survey of the cultural history of the American landscape, including perceptions of landscape as expressed in paintings, photographs, and literature. Landscape values, the relation of landscape to culture, landscape use, and the history of regional and national landscapes are general topics, all seen within the context of the history of the environment.

LA 301 Site Design and Detailing
Fall. 6 credits. Prerequisite: LA 202 with a grade of C or better. Cost of supplies, about $200; expenses for field trip, about $250. Course participants will be engaged in the art and science of site-scaled design. This
includes gardens, parks, and residential projects, their design and technical solutions.

**LA 302 Site Design and Detailing**
Spring. 6 credits. Prerequisite: LA 301 with a grade of C or better. Cost of supplies, about $200; expenses for field trip, about $250. This studio will engage course participants in a wide range of site-scaled projects such as subdivision developments, street improvement projects, and gardens. Projects and associated detailing will build upon knowledge gained in LA 301.

**LA 310 Site Engineering**
Fall. 4 credits. Prerequisite: permission of instructor. Lectures and studio projects focusing on the development of a working knowledge of site grading, earthwork, storm-water management, site irrigation, site layout, and road alignment.

**LA 312 Site Construction**
Spring. 4 credits. Prerequisite: permission of instructor. The design and use of construction materials, also including specifications, cost estimates, and methods used by landscape architects in project implementation. The course includes lectures, studio problems, and development of drawings leading to construction documentation for a selected project. Students will construct detail material prototypes and models.

**LA 360 Pre-Industrial Cities and Towns of North America (also CRP 360)**
Fall. 3 credits. Not offered 1996–97; next offered 1995–96 and 1997–98. Various American Indian civilizations as well as diverse European cultures have all exerted their influences on the organization of town and city living. Each culture has altered the landscape in their own unique way as they created their own built environments.

**LA 363/547 American Indians, Planners, and Public Policy (also CRP 363/547)**
Spring. 3 credits. Decisions made by public agencies and private enterprise too often lead to the flooding, polluting, strip-mining, or other destruction of American Indian reservations, archaeological sites, and burial grounds. The central focus of the course is how to address urban and regional problems without imperiling the cultural survival of minorities.

**LA 401 Advanced Project Studio**
Spring. 6 credits. Prerequisite: completion of LA 401 or the study abroad option with a grade of C or better. Cost of supplies and reproductions, about $200; basic expenses for field trips, about $200. Site design and construction projects introduced as an evaluation of each student's professional competency in landscape architecture.

**LA 402 Urban Design and Planning**
Fall. 6 credits. Prerequisites: LA 302 with a grade of C or better. Cost of supplies, about $200; basic expenses for field trip, about $250. A sequence of projects introducing students to advanced skills in large-scale spatial design, and historic precedent in an urban context.

**LA 410 Computer Applications in Landscape Architecture**
Fall or spring. 3 credits. Offered to landscape architecture students only. This course is designed to develop a working knowledge of various computer software applications (Autocad, Landcad, GIS, etc.) with emphasis on Autocad and Landcad. The course will explore other applications relating to land-use planning and the profession of Landscape Architecture.

**LA 412 Professional Practice**
Spring. 1 credit. Presents the student with a comprehensive understanding of the role of the professional landscape architect and the problems and opportunities one may encounter in an office or other professional situations. Topics discussed include practice diversity, marketing, professional services, office and project management, construction management, computers in the profession, and ethics.

**LA 480 Principles of Spatial Design and Aesthetics (also City and Regional Planning 581)**
Fall. 3 credits. A lecture course that introduces the spatial and visual design vocabularies of cities. Aesthetic principles and motifs of design are investigated for different types of urban spaces drawn from a variety of international examples, historic and modern. Included in the course are design methods and applications in the contemporary urban context of Europe and North America.

**LA 483 Design Criticism**
Spring. 3 credits. A practicum in writing environmental design criticism. Emphasis on impressionistic writing, on analytical descriptions and interpretations or works, and on the role of criticism in environmental design discourse.

**LA 486 Community Design Workshop**
Spring. 3 credits. Permission of instructor. S-U grades optional. This class will offer the opportunity to learn, hands-on, the design process through the designing and building of service-oriented community projects, including parks, greenways, public spaces, playgrounds, gardens and urban design. This course will enable students to both study and experience design and implementation skills at all levels of the design process. Community design and workshop series. Students will learn skills related to community design in a series of workshops and work on a real project with a community.

**LA 487 Experiential Community Design**
Fall. 3 credits. Permission of instructor. S-U grades optional. This class will introduce the opportunity to learn, hands-on, the design process through the designing and building of service-oriented community projects including parks, greenways, public spaces, playgrounds, gardens and urban design. This course will enable students to both study and experience design and implementation skills at all levels of the design process Community Build and Implementation. Students will be engaged in the community-build phase of the community design project initiated the previous spring semester.

**LA 491 Design and Plant Establishment (also HORT 491)**
Fall. 3 credits. Prerequisites: FOH 230 or permission of instructor. This course will focus on the establishment of woody and herbaceous plants in urban and garden settings. By understanding the special constraints placed on plants, we will be able to critically assess and modify potential planting sites, select appropriate trees, shrubs, and ground covers for a given site, and learn about the principles and practices of plant establishment both in the ground and in contained environments. Design followed by specifications and graphic details will be produced to implement these practices. Techniques for tree preservation and land reclamation/revegetation will also be discussed. Field work includes chemical and physical analysis of soils, vegetation, and site assessment.

**LA 494 Special Topics in Landscape Architecture**
Fall or spring. 1–3 credits; may be repeated for credit. S-U grades optional. Topical subjects in landscape architectural design, theory, history, or technology. Group study of topics not considered in other courses.

**LA 497 Individual Study in Landscape Architecture**
Fall or spring. 1–5 credits; may be repeated for credit. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. Work on special topics by individuals or small groups.

**LA 498 Undergraduate Teaching**
Fall or spring. 1–3 credits. Prerequisites: previous enrollment in course to be taught and permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grade optional. Designed to give qualified undergraduates experience through actual involvement in planning and teaching courses under the supervision of department faculty.

**LA 501 Theory, Composition, and Design**
Fall. 6 credits. Limited to graduate students. Cost of drafting supplies about $200. Field trip about $250. Basic design principles and processes applied to the design of the outdoor environment. Studio projects focus on the analysis, organization, and form of outdoor space through the use of three-dimensional components including structures, vegetation, and earthform.

**LA 502 Design, Composition, and Theory**
Spring. 6 credits. Limited to graduate students. Cost of drafting supplies, about $200; expenses for field trip, about $250. The studio will focus on the spatial design of project-scale site development. Students will develop their expertise in applying the design theory, vocabulary, and graphic expression introduced in LA 501.

**LA 505 Graphic Communication**
Fall. 3 credits. Prerequisite: concurrent enrollment in LA 501 or permission of instructor. Basic skills in graphic presentation, including pencil-and-ink drawing and drafting techniques applicable to landscape architecture projects. Basic design in freehand drawing, orthographic projection, axonometric
projection, and lettering are covered in the course.

LA 506 Graphic Communication II
Spring. 3 credits. Prerequisites: LA 505 and concurrent enrollment in LA 502 or permission of instructor. Coverage will focus on modes of landscape representation from ideation to presentation. Projects will in many cases correspond with LA 502 design projects. Representation modes will include for example: freehand, analysis and orthographic drawing; concept modelling; composite drawings; visual books.

LA 514 Advanced Site Grading
Spring. 3 credits. Limited to 8 students. Prerequisite: LA 310 or LA 610. Grading skills and knowledge applied as a design component of site planning projects.

LANAR 520 Contemporary Issues in Landscape Architecture*
Fall. 2 credits. Offered through the College of Architecture, Art, and Planning.

LANAR 524 History of European Landscape Architecture*
Spring. 3 credits. Offered through the College of Architecture, Art, and Planning.

LANAR 525 History of American Landscape Architecture*
Fall. 3 credits. Offered through the College of Architecture, Art, and Planning.

[LA 569 Archaeology on Preservation Planning and Landscape (also CRP 569)]
Fall. 3 credits. Offered alternate years. Not offered 1995–96, next offered 1996–97. In response to federal, state, and local legislation, archaeology now plays an important role in design, planning, and land-use decisions. Students develop the research skills needed to complete environmental review projects and historic landscape plans.

LA 590 Thesis Seminar
Fall. 2 credits. For graduate students in their last year of study. Seminar in research methods and landscape knowledge, culminating in a thesis proposal.

LA 601 Project Design and Application
Fall. 6 credits. Limited to graduate students. Cost of supplies, about $200; expenses for field trip, about $250. Design theory and process as applied to larger scale, site-specific projects while incorporating skills and techniques from site engineering.

LA 602 Natural Systems and Planting Design Studio
Fall. 6 credits. Limited to graduate students. Cost of drafting supplies, about $200; expenses for field trip, about $250. The studio focuses upon site and regionally-based project scales which have as a primary concern natural systems. Projects may have nature-like or garden-like design expressions inherent in the studio exercises. Design knowledge of hydrology, soils, plant associations, culture, geography, history, and microclimate are necessary to engage studio projects.

LA 610 Site Engineering
Fall. 4 credits. Prerequisite: permission of instructor. Lectures and studio projects focusing on the development of a working knowledge of site grading, earthwork, storm-water management, site irrigation, site layout, and road alignment.

LA 612 Site Construction
Spring. 4 credits. Prerequisite: permission of instructor. Construction contracts, specifications, cost estimates, and methods used by landscape architects in project implementation. The course includes lectures, studio problems, and development of construction documentation for a selected project. Students will construct prototypes using landscape construction materials.

LA 666 Pre-Industrial Cities and Towns of North America (also CRP 666)
Fall. 3 credits. Offered alternate years. Not offered 1996–97; next offered 1996–97. Various American Indian civilizations as well as diverse European cultures have all exerted their influences on the organization of town and city living. Each culture has altered the landscape in their own unique way as they created their own built environments.

LA 680 Graduate Seminar in Landscape Architecture
Fall or spring. 1–3 credits. May be repeated for credit. Limited to graduate students. S-U grades optional. Topical subjects in landscape architectural design, theory, history, or technology. Seminar topics and group study not considered in other courses.

LA 694 Special Topics in Landscape Architecture
Fall or spring. 1–3 credits; may be repeated for credit. S-U grades optional. Topical subjects in landscape architectural design, theory, history, or technology. Group study of topics not considered in other courses.

LA 701 Urban Design and Planning (also CRP 555)
Spring. 6 credits. Limited to graduate students. Cost of supplies, about $200; expenses for field trip, about $250. Application of urban-design and town-planning techniques to specific contemporary problems of city environments. Issues of urbanism are investigated and applied to physical design interventions and spatial typologies involving the street, square, block, garden, and park systems. Urban land-use development and public and private implementation of urban-design plans are examined. This is a specially arranged collaborative studio with the Department of City and Regional Planning.

LA 800 Master's Thesis in Landscape Architecture
Fall or spring. 9 credits. Independent research, under faculty guidance leading to the development of a comprehensive and defensible design or study related to the field of landscape architecture. Work is expected to be completed in final semester of residency.

NATURAL RESOURCES


Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

NTRES 100 Principles of Conservation
Fall. 3 credits. Limited to students specializing in natural resources or with permission of instructor. Letter grade only. M WF 9:05–9:55; 1 hr disc to be arranged. R. T. Oglesby. The nature of natural resources, how they are managed, and their interactions with individuals and societies are considered. Case histories are used to illustrate both principles and practices. Emphasis will be on management of renewable resources based on ecological and cultural perspectives.

NTRES 201 Environmental Conservation
Spring. 2 or 3 credits. Letter grade only. M 7:30–9:30 p.m. Optional 1 hr disc sec to be arranged. R. T. Oglesby. An overview of Earth's environmental problems. Lectures will be presented by a series of Cornell's most distinguished authorities and by visiting experts on issues such as global climate change, loss of biological species, destruction of the stratospheric ozone layer and degradation of our planet's oceans. Students may not receive credit for NTRES 201 (Environmental Conservation). Students enrolled in NTRES 201 may earn one additional credit by attending lectures and registering for NTRES 494.

NTRES 201 Environmental Conservation
Spring. 3 credits. M W F 12:20–1:20; 1 hr disc to be arranged. T. J. Fahey. As the end of the 20th century approaches, our lives are increasingly touched by questions about environmental degradation at local, regional, and global scales. This course will stimulate you to go beyond the often simplistic portraits of the environmental dilemma offered by the mass media so that you will have a firmer basis for responsible citizenship and action on environmental issues.

NTRES 210 Introductory Field Biology
Fall. 4 credits. Limited to 90 students. Open to sophomores and juniors with an adviser in Natural Resources or by permission of instructor. Prerequisites: BIO G 101 and 102 or equivalent. 2 overnight field trips required. Cost of field trips, approximately $10. Lec, W 9:05; labs, M W 1:25–4:25 or T R 1:25–4:25. T. A. Gavin and C. Smith. Introduction to methods of inventoring, identifying, and studying plants and animals. Students are required to learn the taxonomy, natural history, and how to identify approximately 150 species of vertebrates and 75 species of woody plants. Selected aspects of current ecological thinking are stressed. The interaction of students with biological events...
in the field and accurate recording of these events are emphasized.

**NTRES 215 Environmental Disruption and Regulation**  

**NTRES 230 Environment and Society**  
Summer, 6-week session. 3 credits. G. M. Berardi. Introduction to societal and environmental factors affecting famine and starvation, "overpopulation," deforestation, water degradation and global warming. Topics include sustainable development, gene banks and biotechnology, nutritional and environmental policy, models for conservation, alternative futures. Case studies from the United States and underdeveloped countries. Optional field trips.

**NTRES 238 Principles of Fish Conservation**  
Spring. 2 credits. Prerequisite: general biology. T R 10:10–11:00. Fishery science staff. This lecture course imparts the biological principles used in protecting and enhancing fish and their environments. Emphasis is on behavior, ecology, and physiology with examples showing how biological principles are used in conservation. Topics include life history patterns, reproductive strategies, migrations, predator-prey relations, social behavior and habitat selection.

**NTRES 260 Ecosystem Management**  
Fall. 3 credits. Prerequisite: NTRES 215. A practical, field-oriented course emphasizing the interaction of natural resource management on land and water. Students work in most phases of the Amot Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $850.

**NTRES 270 Conservation of Birds**  
Spring. 2 credits. C. R. Smith. A course for majors and nonmajors, focusing on bird conservation and management at the organism, population, community and landscape levels. Current resource management issues relevant to birds will be explored in the contexts of agricultural practices, habitat management, and land use. The design and management of natural preserves, endangered species management, global climate change and the economic importance of bird study as an outdoor recreational activity.

**NTRES 271 Conservation of Birds Laboratory**  
Spring. 1 credit. Concurrent enrollment in NTRES 270 required. Limited to NTRES majors. A field-oriented course designed to teach skills of bird observation and identification based on the integration of field marks, songs and calls, and habitat cues. Topics covered include the choice and effective use of field guides, binoculars, and other aids to bird identification; procedures for taking and organizing field notes; the relationships of birds to their habitats and to other birds; and methods and precautions for censusing and surveying songbird populations. Students are required to provide their own binoculars for field use.

**NTRES 300 International Environmental Issues**  
Fall. 3 credits. Junior standing or above. T R 9:05–9:55; 1 hr disc sect to be arranged. R. McNichol and B. Wilkins. Lectures will survey international environmental issues, with some attention to causes and to solutions. Case studies will include such subjects as whales and whaling, tropical deforestation, endangered species and biodiversity, Law of the Sea, Antarctica, ozone depletion, global warming. Institutions such as treaties, development banks, international law, and trade agreements will be examined. Perspectives will include primarily ecology, secondarily ethics, economics, law.

**NTRES 301 Forest Ecology**  
Fall. 3 credits. Prerequisite: Introductory Biology. M W F 11:15. T. J. Fahey. A comprehensive analysis of the distribution, structure, and dynamics of forest ecosystems. Topics include paleoecology of forests, ecophysiology of forest trees, disturbance, succession and community analysis, primary productivity, and nutrient cycling.

**NTRES 302 Forest Ecology Laboratory**  
Fall. 1 credit. Cost of weekend trip approximately $30. Concurrent enrollment in NTRES 301 required. M 1:25–4:25. T. J. Fahey. Field trips designed to familiarize students with the nature of regional forests and to provide experience with approaches to quantifying forest composition and its relation to environmental factors. Optional weekend field trips to Adirondacks and White Mountains, New Hampshire. Group research projects in local forests.

**NTRES 303 Forest and Woodlot Management**  
Fall. 3 credits. Letter grades only. Lec, T R 10:10–11:00; lab R 12:20–4:25. T. J. Fahey. A practical, field-oriented course emphasizing multiple purpose management of small nonindustrial private forestland in the northeastern United States.

**NTRES 304 Wildlife Species Ecology**  
Spring. 3 credits. Prerequisites: broad background in biology; this course is intended primarily for juniors, seniors, and graduate students. Lec, M W F 11:15. Two weekly 2-hour labs to be arranged. A. N. Moen. This course focuses on the physiological, behavioral, and nutrition characteristics of wild species, interactions among species, and their relationships with range characteristics and resources. Short field trips are taken weekly. Computer-based information processing is an integral part of the course.

**NTRES 305 Maply Syrup Production**  
Spring. 2 credits. Limited to 20 students. Prerequisite: permission of instructor required. Letter grades only. Not offered 1995–96. Students work in most phases of the Amos Forest maple operation and learn modern sap collecting, processing, and quality control in producing maple syrup.

**NTRES 306 Coastal and Oceanic Law and Policy**  
Summer. 2 credits. A special 1-week course offered at Cornell’s Shallows Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $850.

Intended for persons interested in careers in management of marine or coastal resources or in the natural sciences. Subjects include law and policy related to ocean dumping, marine sanctuaries, environmental impact statements, water and air pollution, fisheries management, offshore gas and oil production, and territorial jurisdiction. Lectures on the status and history of law are accompanied by discussion of relevant policy and legal techniques. A case study that requires extensive use of the laboratory’s library and personnel is assigned. The week concludes with a mock hearing.

**NTRES 307 Natural Resources Management**  
Fall. 3 credits. Prerequisite: Junior standing. M W F 10:10. B. A. Kruth. Management of natural resources with a focus on fish, wildlife, forest, and water resources. Emphasis is on concepts necessary to formulate and achieve management goals and specific objectives. Topics include organzil, environmental, social, and institutional dimensions of management. Students will be assigned one case study issue for the term, on which all written and oral assignments will build. Grades are based on both individual and group performance.

**NTRES 308 Land and Culture: Systems of Native American Resource Management**  
Spring. 3 credits. Prerequisite: none required; one course each in Natural Resources and American Indian Program recommended. T R 12:20–2:15. S. M. Penningroth. This course presents a cross-cultural examination of natural resource management on land inhabited by indigenous peoples, with emphasis on the United States. Topics include Native religions, technologies, and science; the political and legal basis of tribal sovereignty; and "cultural economics," defined as the tension between traditional Native uses of natural resources and tribal economic development.

**NTRES 350 Ecological Dimensions of Global Change**  
Fall. 3 credits. Prerequisites: college-level courses in biology and chemistry. T R 9:05–9:55, disc sect, R 10:10–11:00 or 3:35–4:25. J. B. Yavitt. A course for students in any major examining how human-induced changes in the biosphere (e.g., land-use change) force climatic change.
Lectures present a comprehensive understanding of our climatic system. Discussions consider the response of biosphere to different scenarios of climatic change and some of the policy intended to mitigate the effects of change.

**[NTRES 400] International Environmental Issues**

Fall. 4 credits. Limited to about 35 students. Prerequisite: junior standing or above. Not offered Fall 1995.

International aspects of the preservation and development of natural and renewable resources. Concepts include development, resource ownership, exploitation, compensation, and preservation. Cultural differences in attitudes and behavior toward environment. Management practices under different cultural, economic, and social systems. Will cover current issues such as acid precipitation; management of migratory whales, fish, and waterfowl; Antarctic development; global climate change; and protection and preservation of tropical rainforests and endangered species. Lecture and discussion, term paper, and examinations. Priority to: seniors, a few graduate students, others with special needs, natural resource majors.

**[NTRES 401] Environmental and Natural Resource Policies**

Fall or spring. 3 or 4 credits. Prerequisites: junior standing and participation in Cornell-in-Washington Program. Concepts and principles fundamental to the environmental policy process. Biological and ecological principles central to decision making in the natural resources arena, particularly at the national and international levels. Role of the legal system in the policy process; roles of citizen organizations, lobbyists, bureaucrats, legislators. Case studies, interviews with Washington officials, several short papers, one exam. A fourth credit available requires a more extensive written assignment and an oral presentation.

**[NTRES 402] Natural Resources Policy, Planning, and Economics**

Spring. 3 credits. Prerequisites: junior standing and permission of instructor. Lec, Jan 2 week intersession; one 2 hr orientation session in December and four 2 hr sessions in January and February. An introduction to the environmental policy process and its conceptual framework. Recognition of phenomena identified as natural resources or environmental problems and issues; steps leading to legislation or regulations to solve problems; implementation and evaluation stages; role of the legal system; roles of citizens, lobbyists, government actors. Case studies; presentations by and discussions with about 25 prominent Washington policy makers appearing as guest lecturers. Required interviews, term paper, oral reports. Several meetings in Ithaca before and after intensive January session in Washington.

**[NTRES 404] Wildlife Populations Ecology**

Fall. 2 credits. Prerequisites: NTRES 304 recommended, computer programming skills required. Lec, M 12:20-1:10, Lab 1:25-4:25. A. N. Moen.

This course focuses on population characteristics, structure, and computer modeling of population dynamics of wild species and natural species and their relationships with range characteristics and resources are also evaluated within the concept of carrying capacity.

**[NTRES 406] Ecology Risk Assessment**

Spring. 3 credits. Prerequisites: BIOES 261 or equivalent; permission of instructor if not an advanced student in natural sciences. Offered alternate odd years. Not offered 1995-96; next offered spring 1997. M W F 11:15-12:05. J. W. Gillett.

This course strives to develop understanding of and competency in types of ecological (non human health) risk assessments. Focus is on cases for chemical, physical, and biological stressors in a variety of circumstances. The proposed USEPA approach under development will serve as the working model.

**[NTRES 407] Religion, Ethics, and the Environment**

Spring. 4 credits. For juniors, seniors, and graduate students; others by permission only. S-U grades optional. T R 9:05-9:55; a hr disc to be arranged. R. A. Bae.

A study of how religion (mainly Christianity and Judaism), philosophy, and ethics contribute to our understanding and treatment of nature. Terms like religion, value, knowledge, nature, and the public interest are examined in detail. Particular themes include the structure of modern science, the nature of moral claims, character and moral development, and the role of mediating structures in fostering environmentally responsible behavior. Also, animal rights, responsibility to future generations; anthropocentric, biocentric, and theocentric views of human beings and nature.

**[NTRES 408] Resource Management and Environmental Law**

Fall. 3 credits. For juniors, seniors, and graduate students. S-U grades optional. T R 10:10-12:05. A senior-level course that introduces the use of legal concepts, doctrines, and remedies in natural resource and environmental management. For a variety of living resources and their habitats, it explores the common law and regulatory processes available for resolving conflicts between exploitation and protection and stresses a practical understanding of how public and private values, economic considerations, and constitutional limitations affect management techniques and objectives.


Spring. 3 credits. Prerequisites: broad background in biology, NTRES 304 (Wildlife Species Ecology) or NTRES 404 (Wildlife Populations Ecology). This course is open to seniors and graduate students. M W F 9:05. A. Moen.

In-depth analyses of the ecological basis for decision making in wildlife management, computer simulations of management problems and effects of options, management information systems, and preparation of computer-based landscape files. Local field trips are taken.

**[NTRES 411] Seminar in Environmental Ethics**

Fall. 3 credits. For graduate students, seniors, and juniors. S-U grades optional. W 1:25-3:50. Moral concerns relative to agriculture and/or the environment. In successive years, the seminar will focus on such topics as: (1) animal rights and animal welfare, (2) natural resources management and the concept of the public interest, (3) doing environmental ethics in a democratic and pluralistic society, and, (4) land use ethics.

**[NTRES 415] Principles and Practices of Agroforestry (also Hort 415)**

Spring. 2 credits. Prerequisites: senior or graduate standing or permission of instructor. S-U option. L. J. Lassoe and K. Mudg.

An introduction to modern and traditional agroforestry systems involving the spatial or temporal integration of multipurpose woody plants (trees and/or shrubs) with annual or perennial crops and/or livestock. Interactions between woody and non-woody components of agroforestry systems will be critically examined from both a biophysical and socioeconomic perspective. Laboratory sessions will include field trips, case studies, use of computer-based sources of information, and practical skills involved in woody plant management (identification, propagation, planting, pruning, measurement).

**[NTRES 417] Wetland Resources**

Summer. 2 credits. Prerequisite: one year of college biology. A special 1-week course offered at Cornell's Shohal Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost (includes tuition, room and board, and ferry transportation), $850.

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.


Fall. 3 credits. (Students may not receive credit for NTRES 418 and NTRES 417.) L. J. Lassoe and K. Mudg.

Examination of the structure, function, and dynamics of wetland ecosystems with an emphasis on principles required to understand how human activities affect wetlands. Current regulations, protection programs, and management strategies are considered.


Fall 1 credit. Optional. Concurrent enrollment in NTRES 418 is required. F 12:20-4:25.

An integrated set of laboratory field exercises designed to expose students to: (a) the diversity of wetland ecosystems; (b) the flora, fauna, soils, and hydrology of wetlands within the region; (c) methods of sampling wetlands vegetation, soils, and water; and (d) methods of wetland classification and delineation. Some exercises will require written reports.
NTRES 420 Introduction to Geographic Information Systems
Fall. 4 credits. For juniors, seniors and graduate students. Limited to 40 students. Prerequisite: experience with DOS. Material fee charged ($10). Lec, T R 9:05; lab, M or T 1:25–4:30. R. Slothower.
This course will provide a comprehensive overview of the concepts, technology, and use of GIS as well as provide extensive hands-on experience with GIS for diverse applications. The course conveys the geographic and analytical skills necessary to define and resolve spatial information problems.

NTRES 438 Fishery Management
Spring. 3 credits. Offered alternate odd years. Not offered 1995–96; next offered spring 1997. T R 8:00–8:55; plus disc. Introduction to management as an adaptive process that focuses on achievement of goals. Coverage includes sport and commercial fisheries and species restoration. Topics include setting goals and objectives, regulations, habitat management, population control, stocking, and management of trout, salmonids, the Great Lakes, and Pacific halibut. Ecological, social, political, and economic aspects of these topics are discussed. C. C. Krueger, B. P. May, E. L. Mills, M. E. Richmond, C. R. Smith.

NTRES 442 Techniques in Fishery Science
Fall. 5 credits. Limited to 15 upperclass and graduate fishery students. Cost of field trips, no more than $30. Offered alternate odd years. Not offered 1996–97; next offered fall 1995 and fall 1997. T R 1:25–4:25; 1 or more weekend field trips. C. C. Krueger.
Emphasis is on methods of collecting data from fish populations and their habitat. Topics include passive and active fish-capture methods, tagging and marking, and physical and chemical habitat measurements. Assumptions and limitations inherent in data sets, research planning, and scientific report writing are also discussed. Several field trips provide hands-on experience in data collection on streams and lakes. T. J. Fahey, M. E. Krasny, J. P. Lassoie, J. B. Yavitt.

NTRES 450 Conservation Biology
Fall. 3 credits. Prerequisite: a reasonable biology background. Not offered fall 1995. Lec, T 10:10–12:05; disc R 10:10 or 11:15. T. A. Gavins.
Biological topics important to the maintenance of biological diversity will be emphasized. Examples include population viability analysis, and the analysis of the demography and genetics of small populations as they are affected by habitat fragmentation and isolation. Students will gain thorough familiarity with these concepts and their potential application through lectures, discussion, and use of computer models. C. C. Krueger.

NTRES 471 Management of Terrestrial Habitats
Spring. 2 credits. Prerequisites: NTRES 210, 304; statistics recommended; junior standing or above. Lec/lab, W 1:25–4:25. C. R. Smith.
A landscape ecological approach will be used to introduce students to habitat concepts and to methods of inventorying, measuring, monitoring, describing, classifying, and restoring terrestrial habitats at a variety of temporal and spatial scales. Field trips will be taken to areas managed by both public and private land management organizations.

NTRES 493 Research in Policy and Human Studies in Natural Resource Management
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. R. A. Baer, D. J. Decker, J. W. Gillett, B. A. Kruth, R. J. McHugh (T), R. J. Ball.

NTRES 494 Special Topics in Natural Resources
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

NTRES 495 Research in Wildlife Science

NTRES 496 Research in Forestry
Fall or spring. Credit to be arranged. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades, letter grade by permission of instructor. B. L. Bedford, T. J. Fahey, M. E. Krasny, J. P. Lassoie, J. B. Yavitt.

NTRES 497 Individual Study in Fishery Science

NTRES 498 Teaching in Natural Resources
Fall and spring. 1–4 credits. Prerequisite: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. Course designed to give students an opportunity to obtain teaching experience by assisting in labs, field trips for designated sections, discussions, and grading. Students will gain insights into the organization, preparation, and execution of course plans through application and discussions with instructor.

NTRES 500 Professional Projects—M.P.S.
Fall and spring. Credit to be arranged. Limited to graduate students working on professional master’s projects. S-U grades only.

NTRES 607 Ecotoxicology (Toxicology 607)
Spring. 3 credits. Prerequisites: graduate or senior status and two 300-level courses in chemistry, biological science, or toxicology. Offered alternate even years. Offered spring 1996 and 1998. M W F 11:15. Lectures, readings, and special guests focus on the principles of effects of toxic chemicals on natural ecosystems, their components, and processes. Major topics include fate and transport of chemicals (chemodynamics), comparative biochemical toxicology, ecosystem process analysis, simulation through mathematical and physical (microcosm) models, and relationships to regulation and environmental management.

NTRES 708 Resource Policy and Administration
Fall. 3 credits. Prerequisite: graduate standing; juniors and seniors with instructor's permission. Not offered 1995–96. T R 2:30–3:45. B. A. Kruth. Discussion of policy, decision making, and administration with emphasis on concepts relevant to policy formulation, implementation, and evaluation. Specific applications are drawn from fisheries, wildlife, forest and water resource management. Topics include actors and stakeholders, organizational effectiveness, professionalism and ethics, resource policy philosophies, and problem-solving aids such as public involvement, conflict resolution, benefit/cost analysis, group decision processes, and program evaluation.

NTRES 710 Introduction to Chemical and Environmental Toxicology
Fall. 3 credits. Prerequisites: biochemistry and animal physiology. Letter grade only. M W F 11:15–12:05. Introduction to the basic concepts of toxicology, biological responses to toxicants, methods of assessing toxicity, and the role of epidemiology. The chemical and biological factors that affect toxicity and specific sources of toxicants, including pollution, agriculture, industrial processes, natural occurring toxicants, and social poisons will be presented. Regulation of toxic materials will be introduced.

NTRES 749 Wildlife Science Seminar
Fall and spring. 1 credit. Prerequisite: permission of instructor. S-U grades optional. Discussion of individual research or current problems in wildlife science.

NTRES 752 Case Studies and Special Topics in Agroforestry
Fall. 2 credits. Prerequisites: NTRES/HORT 415 or permission of instructor. S-U only. Hours to be arranged. Interdisciplinary groups of students examine case study examples of agroforestry practices in developed and developing countries. Specific topical areas are examined in depth, leading to development of a team-written report and a class presentation. Extensive library research and participation in small group discussions are required.
NTRES 616 *Forest Science and Management Seminar*

Fall/spring. 1 credit. Permission of instructor.

Selected readings and discussions of research and/or current problems in forest science and management.

NTRES 618 *Critical Issues in Conservation and Sustainable Development*

Fall. 3 credits. Preference to graduate students with minor in conservation and sustainable development; seniors by permission. Limited to 30 students.

T R 2:30-4:25. J. Schelhas.

Establishes a theoretical foundation for analyzing and addressing conservation and development issues from an interdisciplinary perspective. Engages students in the inherent conflicts between natural resource conservation and the development for human needs. Students will work in interdisciplinary groups to analyze issues and cases from both developing and developed countries.

NTRES 619 *Field Practicum in Conservation and Sustainable Development*

Spring. 3 credits. Limited to 12 students. Includes two-week field study trip to a Latin American country in January. J. Schelhas.

An interdisciplinary study of a conservation and development problem in Costa Rica or the Dominican Republic. The course will use an interdisciplinary research methodology that includes group problem identification, individual and small group research projects, and synthesis of group work to identify key conservation issues and research priorities for a selected site.

NTRES 620 *Applications of Geographic Information Systems*

Spring. 3 credits. Limited to 12 students. Prerequisite: NTRES 618; preference given to graduate students with minor in conservation and sustainable development, permission of instructor. Limited to 12 students. Includes two-week field study trip to a Latin American country in January. J. Schelhas.

Students use GIS techniques to resolve issues involving geographic information within diverse disciplines. Students design, complete, and present the spatial analysis of a problem within their field of study. Lectures, readings, and discussions address application areas and advanced topics in spatial analysis, modeling, and database. Emphasis will include the integration of natural resource information into spatially oriented projects.

NTRES 681 *Detection of Genetic Variation—Lecture*

Fall. 1 credit. Prerequisite: Introductory Genetics course. Not offered fall 1995. M 9:05. B. May.

An introduction to the molecular techniques available to detect genomic variation. The overall emphasis is on providing the student with the theoretical variation basis behind and the practical knowledge of these molecular methods. An optional companion laboratory course (NTRES 682) is also available.

NTRES 682 *Detection of Genomic Variation—Laboratory*

Fall. 2 credits. Concurrent registration in NTRES 681 and permission of instructor required. Not offered fall 1995. Two 5-hr labs per week to be arranged. B. May.

This laboratory course will present protocols and procedures common to many methods used to detect genomic variation as well as illustrating procedures limited to specific techniques.

NTRES 694 *Special Topics in Natural Resources*

Fall or spring. 4 credits maximum. S-U grades optional.

The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under this number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

NTRES 698 *Current Topics: Environmental Toxicology (Toxicology 698)*

Fall, spring. 1-3 credits. Prerequisites: graduate or senior standing in scientific discipline and permission of instructor. Not offered fall 1995.

A student-faculty colloquium on subjects of current interest, usually focusing on multidisciplinary aspects of topical problems (e.g., Superfund, oil spills.).

NTRES 800 *Master's Thesis Research*

Fall and spring. Credit to be arranged. Limited to graduate students working on master's thesis research. S-U grades only.

NTRES 900 *Graduate-Level Thesis Research*

Fall and spring. Credit to be arranged. Limited to graduate students in a Ph.D. program only. Before the 'A' exam has been passed. S-U grades only.

NTRES 901 *Doctoral-Level Thesis Research*

Fall and spring. Credit to be arranged. For students admitted to candidacy after the 'A' exam has been passed. S-U grades only.

Related Courses in Other Departments

See department advisers and curriculum materials for information about other related courses.

- Development Studies (EDUC 662; R SOC 440; 495, 606, 721; CRP 670, 673)
- Ecology and Biology (ENTOM 456, 471; BIOES 263, 272, 378, 457, 462, 471, 473, 475, 476, 478)
- Environmental, Law, Ethics, and Philosophy (S&T 206; CRP 451, 453; PHIL 381)
- Human Systems and Communication (COM 421; CRP 453; R SOC 324, 660)
- Physical Sciences (ABEN 321, 435, 475; SCAS 371; GEOG 104, 202; CEE 432)
- Program Evaluation (HSS 669, 690, 691, 692, 693, 695, 696)
- Public Policy and Politics (GOVT 427, 428; CRP 480; BIO & SOC 461)
- Resource Economics (AG EC 100, 250, 450; 750, 751; ECON 309)
- Spatial Data Interpretation (SCAS 461, 660; ABEN 250; CEE 615, 616)

PLANT BREEDING


Biometry courses are listed under "Biometry and Statistics."

Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

PL BR 201 *Introduction to Plant Breeding*

Spring. 2 credits. Prerequisite: one year of introductory biology or permission of instructor. Lecs, T R 11:15. S. R. McCouch.

This course describes how plant breeders use genetics to alter crop plants. Emphasis is on activities and accomplishments with important impacts on society. Topics to be discussed include the Green Revolution, hybrid crops, sustainable agriculture, biodiversity, pest-resistant lines, and genetically engineered food crops. Class periods include lectures, class discussions, hands-on exercises and excursions to the greenhouse.

PL BR 225 *Plant Genetics*

Spring. 4 credits. Prerequisite: one year of introductory biology or permission of instructor. Limited to 50 students. Lecs. M W 9:05; lab, T or W 1:25, lab section assignments at first lecture. Labs start first week. M. A. Mutschler.

An overview of classical and modern genetic principles using examples from a variety of ornamental, horticultural, and agronomic plant species. Labs provide hands-on experience and an independent project with Brassica campestris. The course may be used to partially fulfill the CALS distribution requirement GROUP B - Biological Sciences. Course redesigned for 1996.

PL BR 401 *Plant Cell and Tissue Culture*

Fall. 3 credits. Prerequisites: a course in plant biology, cell biology, or genetics, or permission of instructor. Lecs, T R 10:10. E. D. Earle.

Lectures and demonstrations dealing with the techniques of plant tissue, cell, proplastot, embryo, and anther culture and the applications of those techniques to biological and agricultural studies. Methods for plant improvement via manipulations of cultured cells will be discussed. Six written assignments and a term paper are required.

PL BR 402 *Plant Tissue Culture Laboratory*

Fall. 1 credit. Enrollment limited. Prerequisites: PL BR 401 (may be taken concurrently) and written permission of instructor. W 1:25-4:25 (alternate weeks) plus 1 hr to be arranged. E. D. Earle.

Laboratory exercises complementing Plant Breeding 401. Techniques for establishing, evaluating, and utilizing plant organ, tissue and cell cultures will be covered. Experiments will use a broad range of plant materials.
PL BR 446 Plant Cytogenetics Laboratory
Spring. 2 credits. S-U grades optional. Prerequisites: BIOGD 281 or PL BR 225. Lab, M 1:25-4:30. K. N. Watanabe. This course aims to provide fundamental knowledge and techniques in plant cytogenetics. Emphasis will be on applications to research on plant genetics and plant breeding. Plant materials involve a wide range of crop species. Specific topics will be covered by invited lecturers.

PL BR 496 Internship in Plant Breeding
Fall or spring. Credits variable, may be repeated to a maximum of 6. Minimum of 60 on-the-job hours per credit granted. Prerequisites: permission of advisor and enrollment during the pre-enrollment period of the semester before the internship. Students must be a plant breeding junior or senior with a minimum 3.0 average in plant breeding courses. Students must attach to their course enrollment materials a "CALS Independent Study, Research, Teaching, or Internship" form signed by the faculty member who will supervise their study and assign their credits and grade. S-U grades only. Staff.

PL BR 497 Individual Study in Plant Breeding
Fall or spring. Credits variable, may be repeated to a maximum of 6. S-U optional. Prerequisites: permission of instructor. Students must register with an Independent Study form (available in 140 Roberts Hall). Staff.

PL BR 498 Undergraduate Teaching
Fall or spring. Credits variable, may be repeated to a maximum of 6. S-U optional. Prerequisites: permission of instructor, and previous enrollment in course to be taught or equivalent. Students must register with an Independent Study form (available in 140 Roberts Hall). Supervision and reporting by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

PL BR 602 Methods of Plant Breeding
Fall. 3 credits. Prerequisite: PL BR 225 or equivalent. M. E. Smith. This is a comprehensive examination of the integration of inbreeding and selection following population improvement methods. Operational details and practical limitations for each method will be considered, as will suitability for major breeding objectives (agronomic characteristics, quality, and biotic and abiotic stress tolerance). The goal is to familiarize students with tools available to plant breeders, criteria for choosing among them, and options for creatively modifying them for specific situations.

PL BR 604 Methods of Plant Breeding Laboratory
Fall. 2 credits. Prerequisite: PL BR 603 or equivalent (may be taken concurrently). T R 1:25-4:15. M. E. Sorrells and R. E. Anderson. Field trips to plant breeding programs involve discussion of breeding methods used, overall goals, selection and screening techniques, and variety and germ plasm release. Additional labs include use of computers in plant breeding research and selection techniques for disease resistance. For a term project each student designs a comprehensive breeding program on a chosen crop.

PL BR 606 Advanced Plant Genetics
Spring. 3 credits. S-U grades optional. Prerequisites: BIOGD 281, PL BR 225, or equivalent. Lect, T R 10:10-11:25. M. M. Kyle. This course provides an advanced survey of genetics in higher plants. Topics include genetic analysis of developmental and metabolic processes, cytogenetics, mating behavior and barriers, and aspects of population and quantitative genetics.

PL BR 608 Biochemical Approaches in Plant Breeding
Fall. 3 credits. Prerequisite: BIOBM 330, 331, or permission of instructor. Lect, M W 11:15; lab, W 7:30-10:30 p.m. J. C. Steffens. A review of biochemical, spectroscopic, and immunological techniques used in the analysis, selection, and generation of crop plants. Examples from current literature and possible applications of new technologies will be discussed. Laboratory will emphasize biochemical techniques used in plant breeding programs. Students should expect to spend more hours in laboratory than suggested by the formal meeting time.

PL BR 622 Seminar
Fall or spring. 1 credit. S-U grades only. T 12:20. Staff and graduate students.

PL BR 629 Special Topics in Plant Science Extension
Spring. 2 credits. F 1:25-4:25. W. D. Pardee. Designed for graduate students and advanced undergraduates to provide a broader knowledge of cooperative extension philosophy and methods. Developed for students interested in extension and research in public and commercial organizations. Topics relate to extension in other countries as well as in the United States.

PL BR 650 Special Problems in Research and Teaching
Fall or spring. 1 or more credits. Prerequisite: permission of instructor supervising the research or teaching. Staff.

PL BR 653.1 Concepts and Techniques in Plant Molecular Biology
Fall. 1 credit. S-U grades optional. Prerequisite: BIOGD 281 and BIOBM 332 or 330 or their equivalent. Recommended: BIOBM 331. Leec, M W F 10:10-11:00 (12 lecs). R. Wu and J. Steffens. A review and update on molecular biology concepts relevant to plant sciences including DNA synthesis, RNA transcription and processing, and protein structure and translation. Methods applicable to plant molecular biology are described including isolation of nucleic acids, gel electrophoresis, recombinant DNA techniques, mutant production, DNA-protein interactions, and use of antibodies.

PL BR 653.2 Plant Biotechnology (also Plant Pathology 663 and BIO PL 653.2)
Fall. 1 credit. S-U grades optional. Prerequisite: BIO PL 653.1 or permission of instructor. E. D. Earle and M. Zaitlin. Leec, M W F 10:10-12 (12 lecs) Sept. 6-Oct. 2. Applications of molecular biology and tissue culture to plant biotechnology are considered. Topics covered include gene introduction and tissue culture technologies, as well as use of cultured plant materials and transgenic plants to obtain resistance to insects, plant diseases and herbicides, to produce useful products, and to improve nutritional and food processing qualities. Regulatory and social issues relating to plant biotechnology are discussed.

PL BR 653.3 Plant Genome Organization
Fall. 1 credit. Prerequisite: BIOLP 653.1. Leec, M W F 10:10-11:00 (12 lecs) Oct. 4-Oct. 30. S. D. Tanksley. This course will cover the origins and measurement of nuclear DNA variation in plants as well as the development and exploitation of molecular markers for breeding as well as the isolation of genes underlying interesting phenotypes.

PL BR 694 Special Topics in Plant Breeding
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

PL BR 716 Perspectives in Plant Breeding Strategies
PL BR 717 Quantitative Genetics in Plant Breeding
Spring. 3 credits. S-U grades only. Prerequisites: PL BR 603 and BTRY 601. Offered alternate years; next offered 1995-96. O. C. Yoder, R. D. R. Viands. Discussion of quantitative genetics to help make decisions for more efficient plant breeding. Specific topics include components of variance (estimated from mating designs), gene pool development, linkage, heritability, phenotypic and genotypic correlation coefficients, and theoretical gain from selection. During one period, plants in the greenhouse will be evaluated to provide data for computing quantitative genetic parameters.

[PL BR 718 Breeding for Pest Resistance]

PL BR 800 Master's-Level Thesis Research
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students working on a master's thesis.

PL BR 900 Graduate-Level Dissertation Research
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students in a Ph.D. program only before the "A" exam has been passed.

PL BR 901 Doctoral-Level Dissertation Research
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students admitted to candidacy after the "A" exam has been passed.

PLANT PATHOLOGY


Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

PL PA 101 Freshman Writing Seminar: Pests, Pesticides, People, and Politics
Fall. 3 credits. Limited to 17 students. Lecs, M W F 8:00. This seminar will examine the use of pesticides, their impact on human health and the environment, and their regulation. Beginning with Rachel Carson's classic Silent Spring, we will examine many facets of the pesticide controversy through readings in current popular literature, technical journals, government documents, industry propaganda, and publications of various so-called "public interest groups." We will emphasize the need for critical thinking as we explore the power of the written word to persuade.

PL PA 102 Freshman Writing Seminar: Environmental Issues and the Changing Global Climate
Spring. 3 credits. Limited to 17 students. Lecs, T R 11:40. J. A. Laurence. This seminar provides an opportunity to learn more about the biological, social, and political impact of environmental issues on scales ranging from local to global. Readings, discussions, and some hands-on experience will provide subjects for a seminar designed to teach writing at levels of single sentences to term papers.

PL PA 201 Magical Mushrooms, Miscellaneous Molds
Spring. Credit optional. Lecs, T R 11:15. G. W. Hudler. A presentation of the fungi and their roles in nature and in shaping past and present civilizations. The historical and practical significance of these decayers of organic matter, as pathogens of plants and animals, as food, and as sources of mind-altering chemicals will be emphasized.

PL PA 241 Plant Diseases and Disease Management
Spring. 4 credits. Prerequisite: one year of biology. Lecs, M W F 11:15-11:30; labs, T or W 1:25. P. A. Arneson. An introduction to plant diseases, their diagnosis, and their management. Topics covered include fungi, bacteria, viruses, nematodes, and other plant pathogens, disease cycles, plant disease epidemiology, disease forecasting, and the principles and practices of plant disease management. This course is intended for students who want a practical knowledge of plant diseases and their control. It is not an adequate prerequisite for plant pathology courses numbered 600 and above.

PL PA 309 Introductory Mycology
Fall. 3 credits. Prerequisite: a year of biology or equivalent. Concurrent registration in PL PA 319 is recommended. Lecs, T R 9:05-9:55; labs, R 1:25-4:25. J. Raatz. An introduction to fungi, emphasizing biology, comparative morphology, and taxonomy.

PL PA 319 Field Mycology
Fall. 1 credit. Prerequisite: permission of instructor. R. P. Korf. Study of mushrooms and other fungi on soil, field, and forest floors. This course consists of exercises to reinforce concepts presented with emphasis on contemporary laboratory techniques and effective use of the literature.

PL PA 444 Integrated Pest Management
Fall. 4 credits. Prerequisites: BIO ES 261, ENTOM 212 or 241, or PL PA 301 or their equivalents or permission of instructor. Lectures integrate the principles of pest control, ecology, and economics in the management of pest-crop systems. Laboratories consist of exercises to reinforce concepts presented in lecture and demonstrate pest monitoring techniques and the application of computer technology to management problems.

PL PA 494 Special Topics in Plant Pathology
Fall or spring. 1-5 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

PL PA 497 Independent Study
Fall or spring. 1-5 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. An opportunity for independent study of a special topic in mycology or plant pathology under the direction of a faculty member.

PL PA 498 Teaching Experience
Fall or spring. 1-5 credits. Students must register with an Independent Study form (available in 140 Roberts Hall). S-U grades optional. Undergraduate teaching assistant in a mycology or plant pathology course by mutual agreement with the instructor.
An examination of the molecular properties of pathogens that control the development of host-parasitic interactions in both microorganisms (viruses, bacteria, and fungi) and higher plants. Contemporary theories describing the genetic mechanisms of pathogenesis and resistance are discussed.

PL PA 653 Plant Biotechnology (PL BR 653.2)
Fall. 1 credit. Prerequisites: BIOGD 281, BIOBM 330 or 331, and BIOPL 653.1. Lecs, M W F 10:10 (12 lecs) Sept.–Oct. 20. M. Zaitlin, R. D. Earle. Applications of molecular biology and tissue culture to plant biotechnology are considered. Topics covered include gene introduction and tissue culture technologies, as well as use of cultured plant tissues to transgenic plants to obtain resistance to insects, plant diseases, and herbicides, to produce useful products, and to improve nutritional and food processing qualities. Regulatory and social issues relating to plant biotechnology are discussed.

PL PA 681 Plant Pathology Seminar
Fall and spring. 1 credit. Required of all plant pathology majors. S-U grades only.

PL PA 694 Special Topics in Plant Pathology
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offers vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

PL PA 701 Concepts of Plant Pathology: Organismic Aspects
Spring. 3 credits. For graduate students with a major or minor in plant pathology, others by permission. Prerequisites: PL PA 401 or equivalent and permission of instructor. Lecs, T R 9:05, lab/disc, R 2–4:25. A. R. Collmer. Concepts in host–pathogen relationships with emphasis on roles of molecules and cells in determining the outcome of an interaction. Genetic, molecular biological, physiological, and cell biological approaches to experimental analysis of host–pathogen systems will be considered. Historical perspectives and recent research will be reviewed and analyzed. Students prepare and review mock grant proposals.

PL PA 702 Concepts of Plant Pathology: Population Aspects
Fall. 3 credits. For graduate students with a major or minor in plant pathology, others by permission. Prerequisites: PL PA 401 or permission of instructor. Lab + discussion section. Lecs, T R 10:10, lab, T 2–4:25. M. G. Milgroom. Theory and concepts in plant disease epidemiology and population biology of plant pathogens. Topics include: population dynamics of pathogens in time and space, interactions of pathogens and plant populations, and population genetics of pathogens. The discussion section will be used for examining current plant pathology literature and other exercises complementary to lecture material.

PL PA 705 Phytovirology
Spring. 2 credits. For graduate students with a major or minor in plant pathology, others by permission. Prerequisites: PL PA 401 or equivalent. Offered alternate years. Not offered 1995–96. M. Zaitlin. This course considers virus structure and composition, classification, replication, effects on hosts, modes of transmission, and the relationships of these aspects to principles of diagnosis and control.

PL PA 706 Phytomycology
Fall. 2 credits. For graduate students with a major or minor in plant pathology, others by permission. Prerequisites: PL PA 401 or equivalent or permission of instructor. Not offered 1995–96. J. W. Lorbeer. Provides basic information on the biology of fungal pathogens, with an emphasis on the structure, ecology, genetics, life cycles, and disease cycles of representative genera and species.

PL PA 715 Phytomycology Laboratory
Spring. 2 credits. Limited to 12 students. Prerequisite: permission of instructor. S-U grades only. Not offered 1995–96.

PL PA 735 Advanced Plant Virology
Spring. 3 credits. Prerequisite: permission of instructors. 3 lecs, hours to be arranged. P. Palukaitis and M. Zaitlin. Topics in plant virology, with an emphasis on student discussion of current literature. Topics included are viral infection processes, viral and vector replication, viral recombination, viral movement, viral genes and their products, cross protection, resistance, molecular approaches to resistance and the use of viruses as vectors for introducing genetic material into plants.

PL PA 738 Genetics and Development of Fungal Genera
Fall. 2 credits. Prerequisite: BIOGD 281 or equivalent. Not offered 1995–96. Hours to be arranged. O. C. Yoder, G. G. Turgeon. Classical and molecular approaches to the study of fungal genetics are discussed. Recently developed molecular technology is highlighted, with emphasis on transformation systems, gene disruption and replacement, gene over-expression, stability of transforming DNA, native transposons and plasmids.
karyotyping by chromosome separation, and secretion of heterologous proteins. Application of contemporary methodology to genetic dissection of developmental processes, such as plant pathogenesis (including host and tissue specificity), the mitotic and meiotic cell cycles, and conidium formation is described. Experimental evidence supporting various hypotheses to explain fungal pathogenicity is evaluated. Examples are chosen from investigations of recently developed plant pathogenic fungi such as Cochliobolus beterisporus and Magnaporthe grisea and from well known genetic models such as Aspergillus nidulans and Neurospora crassa.

PL PA 739 Advanced Mycology
Fall. 4 credits. Prerequisites: PL PA 309 or equivalent, a course in genetics, and permission of instructor. Offered alternate years. R. K. Korf.
A detailed study of the taxonomy, nomenclature, and biology of four major groups of fungi (rusts, smuts, peronosporales, and fungi imperfecti).

PL PA 788 Research in Molecular Plant Pathology
Fall and spring. 2, 4, or 6 credits. Prerequisite: permission of instructor. S. V. S. grades only. S. V. Beer.
Guided research experiences in laboratories addressing questions concerning the interaction of pathogens (bacteria, fungi, viruses) and plants at the molecular level. Intended for beginning graduate students with a concentration in Molecular Plant Pathology and sufficient theoretical background and practical laboratory experience. Students submit plans and reports on each research experience.

PL PA 797 Special Topics
Fall or spring. 1-5 credits. S. U. grades optional.
An opportunity for independent study of a special topic.

PL PA 798 Graduate Teaching Experience
Fall or spring. 1-5 credits. S. U. grades optional. Hours to be arranged. Staff.
Graduate teaching assistance in a mycology or plant pathology course by mutual agreement with the instructor. This experience may include, but is not limited to, preparing, assisting in, and teaching laboratories, preparing and delivering lectures, leading discussion sessions, and tutoring.

PL PA 800 Master's-Level Thesis Research
Fall or spring. S. U. grades optional. Credit to be arranged. Prerequisite: permission of adviser. Graduate faculty. For student's working on a master's degree.

PL PA 900 Graduate-Level Thesis Research
Fall or spring. S. U. grades optional. Credit to be arranged. Prerequisite: permission of adviser. Graduate faculty. For students in a Ph.D. program who have not passed the "A" exam.

PL PA 901 Doctoral-Level Thesis Research
Fall or spring. S. U. grades optional. Credit to be arranged. Prerequisite: permission of adviser. Graduate faculty. For doctoral candidates who have passed the "A" exam.

RURAL SOCIOLGY
Note: class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

[R SOC 100] American Indian Studies: An Introduction
Fall. 3 credits. S. U. grades optional. Not offered 1995-96. W 7-10 p.m. R. W. Venables.
This course provides a foundation for the study of American Indians. Emphasis will be placed on social, cultural, historical, educational, and human development. Guest lectures from Cornell's staff and local Indian communities and media presentations.

[R SOC 101] Introduction to Sociology
Fall or spring. 3 credits. Lecs, T R 10:10-11:00; sec, various times. E. C. Erickson and staff.
A survey of concepts and theories in sociology and an examination of social forces and institutional shaping modern societies. The major topics include culture and socialization, social stratification and social class, age, race, ethnic and gender inequality, deviance and social control, religious, education, and occupation organizations, urbanization and demographic change, social change and social movements, bureaucracy, environmentalism, and the uses of sociology.

[R SOC 175] Issues in Contemporary American Indian Societies
Spring. 3 credits. S. U. grades optional. W 7-10 p.m. R. W. Venables.
Early American Indian history and the postcontact period will be reviewed with an emphasis given to developments since 1789. Topics such as land claims, treaties, education, mineral and water rights, social problems, occupational organizations, and civil rights will be covered, with guest lecturers and media presentations.

[R SOC 200] Social Problems
This course includes a variety of current social problems from a sociological perspective. The course begins with an overview of sociological theories that may account for social problems and identifies common as well as competing elements of these theories. The theoretical framework is then applied to analyses of a variety of social problems, and these may vary semester to semester. Examples of social problems are homelessness, teenage pregnancy, deindustrialization, and homicide, among others. Emphasis in the course will be given to how social problems are measured, and students will be given an opportunity to test theories with data analysis.

[R SOC 201] Population Dynamics
Spring. 3 credits. S. U. grades optional. ALS students must register for this course as R SOC 201. T R 2:50-3:45. L. B. Williams.
This course provides an introduction to population studies. The primary focus is on the relationships between demographic processes (fertility, mortality, and migration) and social and economic issues. Discussion will cover special topics related to population growth and distribution, including marriage and family formation, labor force participation, urban growth and urbanization resource allocation, and the environment.

[R SOC 205] International Development
Spring. 3 credits. M W F 10:10-11:00. P. D. McMichael.
New questions concerning development models in the post-Cold War era are examined from a comparative and global perspective on North-South relations. While the focus is the "Third World," the issues confronting it are often global, even when they concern the most basic issue of food security. Using films and various theoretical perspectives, we examine Southern societies (economies, ecologies, class/gender relations) and the impact of global forces on Southern resources. Such forces include new social diets, new forms of export production, development agencies, multinational institutions, local bureaucracies, transnational corporations, the current debt crisis, and new technologies.

[R SOC 206] Gender and Society
Spring. 3 credits. Lecs, M W F 11:15-12:05; sec, various times. N. Glasgow.
Course will familiarize students with origin of gender hierarchies, social and behavioral similarities/differences between females and males, and degree that biological, psychoanalytic, social psychological, and sociological perspectives help to understand the differences. Objectives will be met through lectures, readings, films, participating in class discussions, and personal experiences. Cross-cultural comparisons of gender role behavior will be made.

[R SOC 208] Technology and Society
The relationship between technology and society is among the most pervasive concerns of our time. Ultimately, what makes a technology useful or "appropriate" is a sociological question. Lectures and readings review classical debates regarding technology and society. Herein, students compare how advanced and inappropriate technologies, identify problems associated with technology transfer to other societies, and create a list of important criteria by which technologies are judged appropriate or inappropriate using numerous case studies.

[R SOC 213] Social Indicators, Data Management, and Analysis
Fall. 3 credits. T R 2:30-3:45. P. R. Eberst.
A survey of definitions of social indicators and general principles of social indicators research will be illustrated from data on both developed and less-developed countries. Data management and analysis of measures of poverty, level of literacy, inequality, quality of life, etc., based on census data, household surveys, and key-informant and other low-cost
techniques, will be examined, using personal computers.

R SOC 301 Theories of Society
Fall. 3 credits. Prerequisites: rural sociology or sociology course. S-U grades optional. M W F 11:15–12:05.
F. W. Young.
An introduction to the "classical" sociological theorists for juniors, seniors, and beginning graduate students. Emphasis on (1) the central concepts of the sociological tradition, (2) major classical theorists (Marx, Durkheim, Weber) and contemporary counterparts. The relevance of these theories of society to current events and social problems will be stressed.

[R SOC 318 Ethnohistory of the Northern Iroquois
R. W. Venables.
The development of Iroquois (Haudenosaunee) history and culture is traced to the present day.

[R SOC 320 Poverty in the United States

[R SOC 324 Environment and Society
Fall. 4 credits. M W F 1:25–2:15.
M. J. Pfeffer.
The main objective of the course is to develop a critical understanding of the dominant trends in modern U.S. environmental thought: preservationism, conservationism, deep ecology, ecofeminism, social ecology, NIMBYism, risk assessment, and environmental equity. Another objective is to familiarize students with some major contemporary substantive environmental problems and policies. These topics include air and water quality, public lands management, biodiversity, deforestation, climate change, and ozone depletion.

[R SOC 331 Demographic Analysis in Business and Government
Spring. 3 credits. S-U with permission of instructor. Prerequisite: R SOC 213 or a statistics course. M W F 1:25–2:15.
W. Brown.
An overview of the way demographic analysis is used in business and government. Through the use of case study and problem solving methods of learning, students come to understand how demographic concepts, methods, and data are used by demographers to solve problems in business and government. The course is designed for upper-level undergraduates from a variety of academic disciplines and career orientations. Students will work on problems drawn from consumer marketing, education, housing and real estate development, human resources, health services.

[R SOC 336 Rural Areas in Metropolitan Society
Fall. 3 credits. S-U grades optional.
D. L. Brown.
This course analyzes the changing structure and role of small towns and rural areas in developed nations. The focus is on rural adaptation to major trends including increased societal differentiation and complexity, increased societal interdependence, and rapid social, economic, technological, and ecological change. Alternative policies to ameliorate rural problems and/or enhance rural contributions to national development are considered.

[R SOC 367 American Indian Tribal Governments
Fall. 3 credits. Not offered 1995–96. W 7:30–9:55 p.m. Staff.

[R SOC 370 Comparative Issues in Social Stratification
Fall. 3 credits. Prerequisite: an introductory social science course. T R 8–4:9–5:55.
S. Feldman or T R 12:20–1:35. T. A. Lyson.
This course reviews both classical and contemporary issues in the comparative social stratification literature. Particular attention is given to the changing configurations of different labor markets, debates on the meaning of new economic constituencies, and the role of gender, race, ethnicity, and sexuality in assessing the patterns and meaning of inequality. Throughout the course we will give special attention to the importance of understanding how questions of measurement are constructed and employed in understanding social inequality.

[R SOC 380 Independent Honors Research in Social Science
Fall and spring. 1–6 credits. Limited to students who have met the requirements for the honors program. A maximum of 6 credits may be earned in the honors program.
Students must submit written proposals by the third week of the semester of their senior year to the departmental honors committee representative, M. Pfeffer.

[R SOC 408 Human Fertility in Developing Nations
Spring. 3 credits. Offered alternate years.
J. M. Stycos.
A review of the major literature dealing with the social causation of variation in human fertility. Emphasis will be on international comparisons and on the methodology of field research.

[R SOC 418 Population Policy
Spring. 3 credits. Prerequisite: R SOC 201 or permission of instructor. Offered alternate years.
J. M. Stycos.
The ways in which societies try to affect demographic trends. Special focus is on government policies and programs to reduce fertility.

[R SOC 425 Gender Relations, Gender Ideologies, and Social Change
Spring. 3 credits. Offered alternate years.
S. Feldman.

[R SOC 430 Migration and Population Redistribution
Fall. 3 credits. Prerequisite: undergraduates, one demography course or permission of instructor. Offered alternate years.
D. L. Brown.
This course analyzes the determinants and consequences of internal migration in urban and rural areas of developed and developing nations. Economic and demographic inter-relationships are emphasized as are implications of changes in local and regional population size and composition for labor supply, the demand for goods and services, and infrastructure. Public policy implications of the inter-relations are investigated. Techniques and measurement issues associated with the analysis of migration and population distribution are discussed.

[R SOC 431 Social Demography of Minorities
Ethnic conflict and accommodation is examined in diverse settings (societies and historical periods). Demographic indicators (such as residential segregation, marital patterns, mortality and fertility differentials, and occupational mobility) of underlying social conditions serve as the principal vehicle for evaluating the status of ethnic relations.

[R SOC 437 Aging and Aging Social Policy in the 1990s
Fall. 3 credits. Prerequisite: R SOC 101 or its equivalent. T R 12:20–1:35.
N. Glasgow.
An analysis of the "graying" of America and the responses of the public and private sectors to this demographic revolution. Examines the interplay between basic and applied knowledge in social gerontology. Explores the formal and informal networks of services, in both rural and urban environments, that help maintain independent living arrangements by the elderly.

[R SOC 438 Social Demography
Fall. 3 credits. T R 10:50–12:05.
A. Basu.
This course surveys the methods, theories, and problems of population studies. Attention is directed to the social, economic, and cultural determinants and consequences of population growth, distribution, and change. The core areas of demography, fertility, mortality, and migration are studied. Comparisons are made between developed and developing areas and between Africa, Asia, and Latin America.

[R SOC 439 Social and Demographic Changes in Asia
Spring. 3 credits. Prerequisite: R SOC 201. Offered alternate years.

[R SOC 440 The Social Impact of Resource Development
Spring. 3 credits. S-U grades optional. Offered alternate years.
C. G. Geisler.
Social impact assessment (SIA) is a method of anticipating unwanted side-effects of projects, policies, and new technologies before they happen and a decision tool for mitigation. The seminar explores SIA applications in different parts of the world and pays particular attention to impacts on native and indigenous peoples. Students learn practical SIA skills and related theoretical/conceptual debates.

[R SOC 442 American Indian Philosophies: Selected Topics
Spring. 3 credits. S-U grades optional.
Prerequisite: Permission of instructor. T 1:25–4:25.
W. Brown.
This course provides an opportunity for students to read and discuss a wide range of American Indian philosophies.
R SOC 475 Global Patterns of International Migration

R SOC 490 Society and Survival
Fall. 3 credits. Prerequisite: introductory sociology course or permission of instructor. Not offered 1995-96. T R 2:30-3:45. D. T. Gurak.

R SOC 492 Contemporary Issues Seminars: Developments in the Pacific Rim

R SOC 494 Special Topics in Rural Sociology
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under this number must be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

R SOC 495 Population, Environment, and Development in Sub-Saharan Africa
Fall. 3 credits. Not offered 1995-96. T R 2:30-3:45. M. M. Kritz. The 47 countries of sub-Saharan Africa are experiencing rapid social change but serious economic, environmental, and social problems. This course will examine these trends by looking at their interrelationships to demographic change. Both the traditional structures and the modernizing forces shaping sub-Saharan African development will be examined, and variations stemming from ethnic and colonial influences assessed. Family, and gender systems, education, urbanization, and demographic processes will be reviewed, as well as the role of state policy in affecting population, ecological and development change.

R SOC 497 Independent Study in Rural Sociology
Fall or spring. 3 credits variable (may be repeated for credit). Students must register with an Independent Study form (available at 140 Roberts Hall). S-U grades optional. Informal study may include a reading course, research experience, or public service experience.

R SOC 603 Classical Sociological Theory
Fall. 4 credits. S-U grades optional. Prerequisites: open to graduate students and undergraduates with permission of instructor. T R 3:35-5:15. M. J. Pfeffer. Students will review the main streams of classical sociological thought, focusing on the work of Weber, Durkheim, and Marx. Course materials include original texts and secondary literature, used to examine the concepts, methods, and explanation in classical sociological thought. An important focus of the course will be to critically evaluate the relevance of the classical theories to contemporary social change and development.

R SOC 604 Theories of Social Change

R SOC 605 Contemporary Sociological Theories of Development
Spring. 3 credits. T R 3:35-5:20. F. W. Young. Development is now understood to include life expectancy, health, and education in addition to material well-being, and it remains a problem everywhere, in both the rich and poor countries, and within them, for regions and communities. Sociological explorations of development have recently crystallized around three competing positions: political economy, rational choice institutionalism, and sociological structuralism. The course will focus on these theories, their antecedents and close cousins, and their research and policy implications.

R SOC 609 Population and Environment

R SOC 610 Population and Development: Developed Nations
Fall. 3 credits. Open to graduate students, and undergraduates with permission of instructor. Not offered 1995-96. W 1:25-4:25. D. L. Brown.

R SOC 618 Research Design I
Fall. 4 credits. Prerequisite: a statistics course. Offered alternate years. Not offered 1995-96; next offered fall 1996. T R 12:20-2:15. J. D. Francis. First of a two-semester sequence (may be taken individually) in introductory graduate methods. Discusses problems of measurement, the design of instruments, and problems of reliability and validity. Common forms of measuring instruments are discussed. Concludes with an introduction to factor analysis. Students apply principles to development of several common types of scales. Computers will be used extensively.

R SOC 619 Research Design II

R SOC 625 State, Economy, and Society
Spring. 3 credits. Offered alternate years. Not offered 1996-97. W 1:25-3:55. P. D. McMichael. Reviews major theories concerning the relations between political and economic institutions and the role of states, markets, firms, social movements, and cultural institutions in the process of social change. Theoretical perspectives are drawn from classical and modern social theory, including the application of comparative and historical methodologies. Substantive themes concern debates about the nature and causes of crisis and sociality and the modern world economy.

R SOC 630 Field Research Methods and Strategies

R SOC 640 Community and Changing Property Institutions
Fall. 3 credits. Limited to upperclass or graduate students. S-U grades optional. Offered alternate years. Not offered 1996-97. M 12:20-2:50. T. A. Lyson. A survey of social, political, and economic factors in regional development. Theories of regional development and underdevelopment are explored. The neoclassical paradigm is offered as a benchmark against which other more "structural" alternatives can be compared. The politics of rural and regional development are explored through sets of readings dealing with industrial policy.

R SOC 642 Regional Systems and Policy Analysis
Spring. 3 credits. Prerequisites: a social or economic theory course and statistics, or permission of instructor. S-U grades optional. Not offered 1995-96. P. R. Elberts.

R SOC 643 Land Reform Old and New
Spring. 3 credits. Offered alternate years. S-U grades optional. R 2:30-5:00. C. G. Geiser. Land reform continues to be a major cornerstone of development planning. Between 1980 and 2000 the number of landless and near-landless in the Third World will approach one billion. Though land reform is a principal source of hope for the landless, its meanings are many and its models are controversial. The seminar acquaints students with land reform in antiquity as well as in contemporary settings (among others, Japan, the Philippines, Israel, ...
Indica, Brazil, Mexico, Russia, and the United States). Perennial issues of equity, efficiency, and sustainability will be discussed in each of these case study areas.

R SOC 645 Rural Economy and Society
Spring. 3 credits. Offered alternate years. Not offered 1996-97. W 7:30-10 p.m. S. Feldman.

The structure and dynamics of rural communities are examined in a comparative historical framework focusing on continuities and divergences among advanced and post-colonial settings. Theories include classical theories of rural social organization and their recontextualization in contemporary peasant studies and agrarian political economy literatures, theorizations of locality, rurality and spatial complexity within the world economy, and critical issues framing the relationship between political and labor market restructuring and petty commodity and household production systems.

R SOC 655 Advanced Techniques of Demographic Analysis
Spring. 3 credits. Prerequisites: R SOC 481 or CHH 430, graduate standing or permission of instructor. Not offered 1995-96; next offered fall 1996. T R 4-5:30. D. T. Gurak.

An examination of analytical techniques that assumes a basic knowledge of demographic data and research methodology. Life tables, demographic estimates with incomplete data, survey techniques to supplement inadequate vital registration systems, data management, multi-level models, and other multivariate procedures are among the topics to be covered.

R SOC 660 Social Analysis of Ecological Change
Fall. 3 credits. Prerequisite: graduate standing. T 12:25-4:25. P. Taylor.

Scientific studies of ecological and social processes, together with the interpretation of those studies by historians, sociologists, and anthropologists. Topics include ideas of nature, colonial conservation science, systems ecology, the key concepts of the commons, neo-Malthusianism, human ecology, local knowledge, nomadic pastoralism, political ecology, women and eco-development, and global environmental discourse.

R SOC 661 Sustainable Agriculture and Development
Fall. 3 credits. S-U grades optional. Prerequisites: graduate standing or instructor's permission. W 1:25-4:25. T. A. Lyson.

This course examines the relationship between local agriculture and development as these are embedded in a globalizing economy. Topics include an examination of the social scientific theoretical underpinnings of conventional agriculture, the social origins of sustainable agriculture, environmental and community sustainability, and the political and policy contexts of more sustainable agricultural systems.

R SOC 694 Special Topics in Rural Sociology
Fall or spring. 4 credits maximum. S-U grades optional. The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number will be approved by the department curriculum committee, and the same course will not be offered more than twice under this number.

R SOC 694.1 Special Topics: Socio-Economic Issues in Protected Area Management
Fall. 2 credits. Enrollment limited to 20 students. T R 2:20-2:35. C. Geisler and D. Chapman.

This course addresses various social science concerns in the management of protected areas in international perspective. These concerns pertain to areas where human presence is restricted and to a range of integrated conservation and development projects where production and protection agendas are both viewed as important to sustainability. It will follow a seminar format and requires a high degree of participation by students.

R SOC 715 Comparative Research Methods

This seminar focuses on the comparative case study approach. Illustrations of the comparative research approach will cover a range of data types and problems.

R SOC 718 Multidimensional Measurement and Classification

An advanced course in measurement and scaling, building on work by Thurstone, Guttman and Coombs to multidimensional measurements. Topics include philosophy of factor analysis, factor-analysis models, factoring design, factoring techniques, and comparison with factor-analysis models. Cluster analysis, the multidimensional scaling are the other major topics discussed. As matrix algebra is an integral part of these procedures, class time is devoted to this topic. Computers are used to analyze fit to models.

R SOC 719 Logistic and Log Linear Models

The first part of the course reviews multiple regression theory and procedures, after which extensions of the univariate data are discussed. Consideration is given to violations of assumptions and their effects. Then more advanced regression concepts and estimation techniques are discussed. The main focus of the course is on logit and log linear models. Computerized labs are an integral part of the course.

R SOC 721 Sociology of Environment and Development

This course examines society/environmental relations in the contemporary environmental discourse and in sociology. Students evaluate such topics as sustainability, science and ethics, and the definition of nature. The central objective is to evaluate sociological theories' treatment of the problems of environmentalism. Subsidiary objectives include the identification of key sociological issues in contemporary environmentalism, and review of environmental themes in sociological theory.

R SOC 723 Social Movements in Agrarian Society

R SOC 725 The Sociology of "Third World" States

R SOC 730 Sociology of the World Economy

Analyses of social change and development are increasingly sensitive to global context, including the sociology of the world economy as a multi-layered entity, anchored in an evolving division of world labor and interstate system. The analysis of transnational economic and cultural processes (such as food regimes, commodity chains, and international labor complexes), has substantive and methodological dimensions, considering a variety of levels and kinds of analysis of global processes. This includes global theories (and their limits), and methods of situating local processes within their world-historical context.

R SOC 741 Community Development and Local Control
Fall, spring. Credit to be arranged. Limited to graduate students; others by permission of instructor.

R SOC 771 Special Seminar
Fall or spring. Credit to be arranged. Limited to graduate students. S-U grades only. Participation in the ongoing teaching program of the department.

R SOC 791 Teaching Experience
Fall or spring. 1-3 credits. Limited to graduate students. S-U grades only. Participation in the ongoing teaching program of the department.

R SOC 792 Public Service Experience
Fall or spring. Credit to be arranged. Limited to graduate students. S-U grades optional. Participation in the ongoing public service activities of the department.

R SOC 800 Master's-Level Thesis Research
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. S-U grades optional. Graduate faculty. For students admitted specifically to a Masters program.

R SOC 871-874 Informal Study
Fall or spring. Credit to be arranged. Limited to master's and doctoral degree candidates with permission of the graduate field member concerned. S-U grades optional.
R SOC 871 Rural Sociology
R SOC 872 Development Sociology
R SOC 873 Organization Behavior and Social Action
R SOC 874 Methods of Sociological Research
R SOC 900 Graduate-Level Thesis Research
R SOC 901 Doctoral-Level Thesis Research

For students in a Ph.D. program only before the "A" exam has been passed.

Related Courses in Other Departments

(Other may be added)
Introduction to Sociology (SOC 101)
Population Dynamics (SOC 205)
Gender and Society (WOMNS 206)
Social Analysis of Ecological Change (S&T 680)
Population Policy (B SOC 414)
Gender Relations, Gender Ideologies, and Social Change (WOMNS 524)

Special Topics: Socio-economic Issues in Protected Area Management (ARME 700)

Summer Session Courses

Introduction to Sociology (6-week session)
Environment and Society (3-week session)
Successful Aging: Today and Tomorrow (3-week session)

SOIL, CROP, AND ATMOSPHERIC SCIENCES

R. J. Wagenet, chair, M. Alexander,
P. C. Bavey, D. R. Boulton, B. Bryant,
J. H. Chemey, S. J. Colucci, K. H. Cook,
W. J. Cox, S. D. DeGloria, J. M. Duxbury,
E. C. Fernandes, G. W. Fick, D. L. Grunes,
R. R. Hahn, J. L. Hutson, S. D. Klausner,
W. W. Knapp, L. V. Kochian, T. A. LaRue,
R. F. Lucey, M. B. McBride, J. M. Pleasants,
R. L. Obendorf, W. D. Pardee, J. H. Peverly,
W. S. Reid, S. J. Riha, T. W. Scott, T. L. Setter,
L. P. Steponkus, H. M. van Es,
A. Van Wambeke, R. M. Welch, D. S. Wilks,
M. W. Wisniski, R. W. Zobel

Note: class meeting times are accurate at
the time of publication. If changes are necessary,
the department will provide new information as soon as possible.

Courses by Subject

Atmospheric Science: 101, 102, 131, 250, 331, 352, 354, 358, 392, 395, 397, 398, 446, 448, 451, 456, 465, 468, 482, 599, 609
Crop Science: 311, 312, 314, 315, 317, 608, 610, 612, 613, 614, 642, 690, 691, 829, 929
Remote Sensing: 461, 660


General Courses

SCAS 190 Sustainable Agriculture
Fall or spring. 2 credits. Limited to 60 students. S-U grades optional. Lec, R 9:05; labs, M 2:00-4:25, T 10:10-12:35. G. W. Fick.
This course is designed to be an enjoyable introduction to basic food production resources (seeds, crops, and climates), and emphasizes management concepts that conserve or renew those resources for continuing benefit to society. Presentations are targeted for non-majors and students new to the field and cover information of general interest. Laboratories include several field trips and stress hands-on experience with soils, crops, and descriptive climatology. The laboratory is required.

SCAS 494 Special Topics in Soil, Crop and Atmospheric Sciences (undergraduate level)
Fall or spring. 4 credits maximum. S-U grades optional.
The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number are approved by the department curriculum committee, and the same course is not offered more than twice under this number.

SCAS 497 Individual Study in Soil, Crop, and Atmospheric Sciences
Fall or spring. 1-6 credits. S-U grades optional.
Students must register with an Independent Study form (available in 140 Roberts Hall).
The topics in soil science or crop science or atmospheric science are arranged at the beginning of the term for individual study or for group discussions.

SCAS 498 Teaching Experience in Soil Science, Crop Science, and Atmospheric Science

SCAS 499 Undergraduate Research
Fall or spring. Credit to be arranged. Students must register with an Independent Study form (available in 140 Roberts Hall).

SCAS 694 Special Topics in Soil, Crop and Atmospheric Sciences (graduate level)
Fall or spring. 4 credits maximum. S-U grades optional.
The department teaches "trial" courses under this number. Offerings vary by semester, and will be advertised by the department. Courses offered under the number are approved by the department curriculum committee, and the same course is not offered more than twice under this number.

SCAS 695 Planning and Reporting Research
Spring. 2 credits. Prerequisite: graduate student status or permission of the instructor. Limited to 10 students. Lec to be announced. G. W. Fick.

This course is designed to prepare students in the SCAS Department and closely related fields for planning their graduate research and reporting research results. Emphasis is given to literature reviews, scientific writing and reviewing (either through proposals, grant proposals, or manuscripts for publication), and slide and poster presentations. Students are expected to work closely with their major professor as well as the instructor of the course.

Atmospheric Science

SCAS 101/102 Science of Earth Systems Colloquium (also ABEN 120/121, GEOL 123/124, SES 101/102)
Fall and spring. 2 credits. Lec, T 2:30-4:25, T. Jordan.
Weekly one-hour seminars followed by discussion of current topics in the study of the earth system. Introduces the student to scientific issues relating to understanding our planet and management. See "Interdisciplinary Centers, Programs, and Studies" in the introductory section of the catalog for a complete description of a new program in the Science of Earth Systems.

SCAS 131 Basic Principles of Meteorology
Fall. 2 credits. Lecs, T R 11:15; lab, T W or R 12:45-2:25 and M W 7:00-9:30 p.m. M. W. Wisniski.
A simplified treatment of the structure of the atmosphere: heat balance of the earth, general and secondary circulations, air masses, fronts, and cyclones; and hurricanes, thunderstorms, tornadoes, and atmospheric condensation. In the laboratory, emphasis is on techniques of analysis of weather systems.

SCAS 250 Meteorological Observations and Instruments
Spring. 3 credits. Prerequisite: SCAS 131.
M. W. Wisniski.
Methods and principles of meteorological measurements and observations, including surface, free-air, and remote systems. Instrument siting, installation, and protection. Instrument response characteristics, calibration, and standardization. Recorders and data-logging systems. Laboratory exercises in observation and data analysis. Intended to serve as preparation for Observers Examination.
Lab fee, $45.

SCAS 331 Climate Dynamics (also ASTRO 331, SES 331)
Fall. 4 credits. Prerequisites: MATH 112 or 192 or equivalent.
Processes that determine climate and contribute to its change are discussed, including comparisons with climates of other planets. Application to problems of climate change and variability include the astronomical theory of ice ages, greenhouse warming, the ozone hole, African drought, and Amazonian deforestation.

SCAS 332 Evolution of the Earth System (also SES 302, GEOL 302)
Spring. 4 credits. Prerequisites: MATH 112 or 192 and CHEM 207 or equivalent.
Lecs, M W F 11:15-12:05; disc, T 1:25. B. Isacks and others.
Co-evolution of life and the earth system: Earth's early history; plate tectonics, continental drift and climate changes during the past billion years; mountain building, ice ages, and
our own emergence during the past ten million years. Introduction to methods of interpreting information preserved in the rock record.

SCAS 334 Microclimatology
The relationships of radiant energy, temperature, wind, and moisture in the atmosphere near the ground. The interplay between physical processes of the atmosphere, plant canopies, and soil is examined, with emphasis on the energy balance.

SCAS 342 Theoretical Meteorology I
Fall. 3 credits. Prerequisites: one year of calculus and one semester of physics. M W F 9:05–9:55. M. W. Wysocki.
Introduction to the thermodynamics and hydrostatics of the atmosphere and to the methods of description and quantitative analysis used in meteorology. Topics covered include thermodynamic processes of dry air, water vapor and moist air, and concepts of hydrostatics and stability.

SCAS 343 Theoretical Meteorology II
Weather map analysis and forecasting techniques are studied by applying the principles of fluid and heat flow. This course will strengthen previously introduced meteorological concepts that will be applied to forecasting mid-latitude synoptic scale weather systems, such as cyclones, anticyclones, jet streams, fronts, and waves.

SCAS 352 Synoptic Meteorology I
An introduction to numerical techniques using Fortran to solve meteorological problems. No previous experience with Fortran is expected. No previous experience with Fortran is expected.

SCAS 345 Statistical Methods in Meteorology
Fall. 3 credits. Prerequisite: an introductory course in statistics (e.g., BTRY 215 or ARME 310) and calculus. T R 10:10–11:25. D. S. Wilks.
Statistical methods used in climatology, operational weather forecasting, and selected meteorological research applications. Some statistical characteristics of meteorological data, including probability distributions, intercorrelations, and persistence. Operational forecasts derived from multiple regression models, including the MOS system. Forecast verification techniques and scoring rules. Time series analysis, EOFs, and other research topics as time permits.

SCAS 444 Tropical Meteorology
Structure and dynamics of the tropical atmosphere on a wide range of time and space scales ranging from meso-scale convective systems to planetary waves. Topics include hurricanes, monsoon circulation, and El Nino.

SCAS 446 Atmospheric Modeling
Numerical models of the atmosphere, including simple climate, general circulation, and numerical weather prediction models. We will focus on choosing a set of governing equations for a particular application and translating that system into a diagnostic or predictive model.

SCAS 448 Physical Meteorology
Primarily a survey of natural phenomena of the atmosphere, with emphasis on their underlying physical principles. Topics include composition and structure of the atmosphere, atmospheric optics, acoustics and electricity, solar and terrestrial radiation, and principles of radar probing of the atmosphere.

SCAS 451 Synoptic Meteorology II
Fall. 3 credits. Prerequisite: SCAS 343. Lecs, T R 9:05; lab, M 1:25–3:20. S. J. Colucci.
Structure and dynamics of large-scale mid-latitude weather systems, such as cyclones, anticyclones and waves, from the perspective of the quasigeostrophic diagnostic model of the atmosphere.

SCAS 456 Mesoscale Meteorology
Structure and dynamics of mid-latitude mesoscale weather systems such as fronts, jets, squall lines, convective complexes, precipitation bands, downslope windstorms, mountain breezes, sea breeze circulations, and lake effect snowstorms.

SCAS 635 Advanced Statistical Meteorology
Fall. 3 credits. Prerequisites: coursework in or elementary knowledge of statistics, calculus, matrix algebra, and computer programming. Lect, T R 10:10–11:25; R 11:35–12:05. D. S. Wilks.
Lectures and topics concurrent with SCAS 455, plus an extra 40-minute session per week in which selected topics from SCAS 455 are treated in more depth, and additional topics are covered which may vary from year to year according to student interest. Term project required.

SCAS 652 Atmospheric Dynamics
Advanced topics in theoretical meteorology such as atmospheric waves, hydrodynamic instability, the general circulation of the atmosphere, and middle atmosphere dynamics.

SCAS 682 Special Topics in Atmospheric Sciences
Fall or spring. 1–6 credits. S-U grades optional. Study of topics in atmospheric science that are more specialized or different from other courses. Special topics to be decided will depend on staff and student interests.

SCAS 850 Master's-Level Thesis Research in Atmospheric Sciences
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty.
Limited to students specifically in a master's program.

SCAS 850 Graduate-Level Dissertation Research in Atmospheric Sciences
Fall or spring. Credit by arrangement. S-U grades optional. Hours by arrangement. Limited to students in a Ph.D. program only before the "A" exam has been passed.

SCAS 951 Doctoral-Level Dissertation Research in Atmospheric Sciences
Fall or spring. Credit by arrangement. S-U grades optional. Hours by arrangement. Graduate faculty.
Limited to students admitted to candidacy after the "A" exam has been passed.

Crop Science
SCAS 311 Grain Crops
Fall. 4 credits. Prerequisite: SCAS 260 or BIOL 241. Lecs, M W F 10:10, lab, M or T 1:25–4:25. 1 or 2 field trips during lab periods (until 5 p.m. or on weekends). R. L. Obendorf.
Principles of field-crop growth, development and maturation, species recognition, soil and climatic adaptations, liming and mineral nutrition, weed control, cropping sequences, management systems, and crop improvement are considered. Grain, protein, oil, fiber, and sugar crops are emphasized. Laboratory utilizes living plants, extensive crop graden and computerized simulation.

SCAS 312 Forage Crops
Spring. 4 credits. Prerequisite: SCAS 260 or BIOL 241 or equivalent. Recommended: an understanding of chemical, fertilization, and weed control. Lecs, M W F 11:15; lab, M or T 1:25–4:25. G. W. Fick.
The production and management of crops used for livestock feed are considered in terms of establishment, growth, maintenance, harvesting, and preservation. Forage grasses, forage legumes, and corn are emphasized, and consideration is given to their value as livestock feed in terms of energy, protein, and other nutritional components.

SCAS 314 Production of Tropical Crops
Spring. 3 credits. Offered 1996. Hours to be announced. E. C. Fernandes. An introduction to major tropical cropping systems, their characteristics and management for sustainability.

SCAS 315 Weed Science
Fall. 3 credits. Prerequisite: introductory course in biology or botany. Staff. Principles of weed science are examined. Emphasis is on (a) weed ecology, (b) chemistry of herbicides in relation to effects on the environment and plant growth, and (c) control of weeds in crops. Laboratory covers weed identification and ecology, herbicide selectivity, symptomology, and behavior in soil.

SCAS 317 Seed Science and Technology
Fall. 3 credits. Prerequisite: BIOL 241 or equivalent. Offered alternate years. Offered fall 1995 and 1997. Lecs, T R 11:15; lab, R 1:25—4:25. 2 all-day field trips will be scheduled during the semester. A. G. Taylor, Geneva Experiment Station. (Ithaca contact, R. L. Obendorf.) The principles and practices involved in the production, harvesting, processing, storage, testing, quality management, certification, and use of high-quality seed from improved cultivars. Information is applicable to various kinds of agricultural seeds. Hands-on laboratory experience.

SCAS 608 Water Status in Plants and Soils
Fall. 1 credit. Prerequisite: permission of instructor. S-U grades only. Offered alternate years. Offered fall 1996. Lect, 1 hour to be arranged; lab, R 1:25—4:25 or as arranged. T. L. Setter. Techniques for field appraisal of the status of water in plants and soil, including methods used in physiological studies, such as the psychrometer, pressure chamber, gas exchange analyzer, and abscisic acid analysis with ELISA.

SCAS 610 Physiology of Environmental Stresses
Spring. 3 credits. Prerequisite: BIOLP 242 or 341. Offered alternate years. Offered spring 1996 and 1998. Lecs, T R 10:10—11:25. P. L. Steponkus. A study of the responses of plants to environmental stresses, with emphasis on thermal stresses including chilling, freezing, and high temperature injury. Emphasis is on the physiological and biochemical basis of injury and plant resistance mechanisms at the whole-plant, cellular, and molecular levels.

SCAS 612 Seed Physiology
Spring. 3 credits. Prerequisite: plant physiology. T R 8:30—9:55. R. L. Oldorf. Morphology, physiology, and biochemistry of cereal, legume, and oil-seed formation, composition, storage, and germination. Emphasis is on the deposition of seed reserves during seed formation, stabilization of reserves during storage, and mobilization of reserves during germination. Topics range from on-farm problems to molecular mechanisms.

SCAS 613 Physiology and Ecology of Yield

SCAS 614 Research Methods in Weed (also Civil and Environmental Engineering 441)
Spring. 2 credits. Prerequisite: SCAS 315 or equivalent. Offered alternate years. Not offered spring 1996. Staff. Examination of a variety of modern techniques used to study herbicide absorption, translocation, metabolism, mode of action, and mechanism of resistance. Experiments will also be designed to study herbicide behavior and detection in soil. Laboratories will be accompanied by short lectures pertinent to experimental topics.

SCAS 642 Plant Mineral Nutrition (also BIOL P 642)
Spring. 3 credits. Prerequisite: BIOL P 341 or equivalent. Offered alternate years. Next offered spring 1997. Lecs, M W F 10:10—11:15; lab, R 1:25—4:25. L. V. Kochian, R. M. Welch. A detailed study of the processes by which plants acquire and utilize mineral nutrients from the soil. Topics will include the uptake, translocation, and compartmentation of mineral elements; root-soil interactions; translocation and metabolism of mineral elements; the involvement of mineral nutrients in various physiological processes; and nutrition of plants adapted to extreme environmental stresses (e.g., acid soils). Specific mineral elements will be emphasized to illustrate the above topics.

SCAS 690 Root-Soil Interactions
Fall or spring. 1—2 credits. S-U grades optional. Hours to be arranged. R. W. Zobel. A topic dealing with root-soil interaction will be selected during the first meeting of the term. Students will prepare one or two seminars based on published work on the topic. Possible topics include root genetics, root morphology, conservation tillage, and soil temperature.

SCAS 691 Special Topics in Crop Science
Fall or spring. 1—6 credits. S-U grades optional. Hours to be arranged. Staff. Study of topics in crop science that are more specialized or different from other courses. Special topics to be offered will depend on staff and student interests.

SCAS 692 Master’s-Level Thesis Research in Crop Science
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students specifically in a master’s program.

SCAS 920 Graduate-Level Thesis Research in Crop Science
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students in a Ph.D. program only before the "A" exam has been passed.

SCAS 921 Doctoral-Level Dissertation Research in Crop Science
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students admitted for candidacy after the "A" exam has been passed.

Remote Sensing
[SCAS 461 Remote Sensing: Environmental Applications (also Civil and Environmental Engineering 441)]
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1995—96. A survey of how remote sensing is applied in various environmental disciplines. Laboratory emphasis is on using aircraft and satellite imagery for inventorying and monitoring surface features in engineering, planning, agriculture, and natural resource assessments.

SCAS 660 Remote Sensing Fundamentals (also Civil and Environmental Engineering 610)
Spring. 3 credits. Prerequisite: permission of instructor. Lecs, T R 10:10—11:15; lab, R 2:30—4:30. W. D. Philpot. An introduction to equipment and methods used in obtaining images about earth resources and the environment from aircraft or satellite. Coverage includes sensors, sensor and ground-data acquisition, data analysis and interpretation, and project design.

Soil Science
SCAS 260 Introduction to Soil Science
Spring. 4 credits. Prerequisite: CHEM 103, 207 or 215. S-U grades optional. Lecs, M W F 9:05; lab, M T W or R 1:25. R. B. Bryant. A comprehensive introduction to the field of soil science, with emphasis on scientific principles and their application to solving soil management problems. The laboratory exercises stress quantitative measurement of soil properties.

SCAS 321 Soil and Water Management
Spring. 2 credits. Prerequisites: SCAS 190 or 260. S-U grades optional. An interdisciplinary course intended to introduce students to the general principles of soil and water interaction and to the effects of human intervention in these processes. Aspects of soil and water management, including hydrology, soil erosion, irrigation, drainage, and water quality are examined. Case studies from both the United States and the tropics are used to illustrate basic principles.

SCAS 362 Soil Morphology
Fall. 1 credit. Undergraduates only. Recommended for sophomores and juniors. R. 1:25—4:25; all day field trip required. R. B. Bryant and J. M. Galloway. The principles for field identification of soil properties, profiles, and landscapes are presented. A series of soil pits are examined, described, classified, and interpreted in the field.

SCAS 363 Intermediate Soil Science I: Genesis, Classification, and Survey
Fall, weeks 1-7. 2 credits. Prerequisite: SCAS 260. Lecs, M W F 10:10; lab, W 1:25—4:25. One all day field trip is required. R. B. Bryant. Factors and processes of soil formation. Principles of field identification, classification,
SCAS 364 Intermediate Soil Science II: Physics
Fall. 3 credits. Prerequisites: SCAS 260, one year of calculus and consent of instructor. Lecs, M W F 10:10; lab, W 1:25–4:25. P. C. Baveye. Description and measurement of the status of water in soils. Theory of water, solute, and heat transport. Infiltration, drainage, and redistribution. Weekly laboratory and problem-solving sessions illustrate the concepts introduced in class. Course starts at mid-semester and is part of a sequence of three Intermediate Soil Science courses.

SCAS 365 Intermediate Soil Science III: Chemistry and Microbiology
Spring. 3 credits. Prerequisites: SCAS 260, T R 10:10–11:30. M. B. McBride and M. Alexander. The chemical properties and microorganisms of soil and the chemical reactions and transformations occurring in soil. This course is part of a sequence of three Intermediate Soil Science courses.

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

SCAS 372 Soil Fertility Management
Fall. 3 credits. Prerequisite: SCAS 260 or permission of instructor. M W F 9:05. D. R. Boulidin. An integrated discussion of soil crop yield relationships, with emphasis on the soil as a source of mineral nutrients for crops and the role of fertilizers and manure in crop production.

SCAS 373 Soil, Water, and Aquatic Plants
Fall. 3 credits. Prerequisites: SCAS 260, BIO G 101–102, and CHEM 103–104 or equivalents. Lecs, T R 11:15; lab, R 12:20–2:25. J. H. Peverly. The success or failure of soil and water management is manifested in streams, wetlands, lakes, and aquifers. Chemical and biological changes downstream are studied and related to agricultural management techniques used in agriculture. Basic chemical and physiological processes are presented and used to suggest appropriate responses to water management problems.

SCAS 385 Biogeochemical Cycles, Agriculture, and the Environment
Spring. 3 credits. Prerequisites: CHEM 103 or 207 and SCAS 260 or equivalent. Lecs, T R 11:15–12:05. J. M. Duxbury. The impact of agriculture on aspects of the global biogeochemical cycles of carbon, nitrogen, sulfur, and phosphorus is discussed and illustrated with current agricultural and environmental issues. Topics include sustainable agriculture, effects of nitrogen fixation, acid rain, global warming, and land disposal of wastes.

SCAS 471 Properties and Appraisal of Soils of the Tropics
Spring. 3 credits. Prerequisite: SCAS 260 or equivalent. S-U grades optional. No audits accepted. Offered alternate years. Offered spring 1996 and 1998. Lecs, T R 12:30–1:20. A. Vambeke. The course examines the conditions in which soils form, and considers ecological, geological and vegetational factors that produce the diversity that exists among them. The major kinds of soils and their management properties described, and methods to alleviate the constraints to crop production examined. Topics include the identification of soils, and their functions in sustaining traditional farming systems and advanced technological packages. The course pursues these themes reviewing the most recent sources of information generated in tropical countries and published in Latin-American, Francophone, and English journals. The last part of the course gives special attention to salt-affected soils, paddy rice cultivation and the characteristics of acid-sulfate soils.

SCAS 473 Ecology of Agricultural Systems (also BIOES 473)
Fall. 3 credits. Limited to 45 students. Prerequisite: BIOES 261 or permission of instructor. S-U grades optional. Offered alternate years. Next offered fall 1996. Lec and disc, T R 2:30–3:45. During the first 6 weeks of class, the Thursday meetings may run to 5:00 because of field trips. A. Peverly. Analysis of the ecological processes operating in agricultural systems, with an emphasis on the interactions between organisms. Topics include nutrient dynamics in agroecosystems, plant competition and facilitation, intercropping, the ecology of species invasions, plant-herbivore mutualism in agroecosystems, plant-herbivore relations, plant-pathogen interactions, biological pest control, and evolutionary processes in agriculture. Case studies from both the tropics and the temperate zone are used to illustrate important concepts.

SCAS 483 Environmental Biophysics
Fall. 3 credits. Prerequisite: SCAS 260 or equivalent or permission of instructor. Lecs, M W F 11:15. S. J. Riba. Introduction to basic principles of energy and water transfer and storage in soil-plant systems. Energy budgets, soil heat flow, water movement in saturated and unsaturated soils, evapotranspiration, and water dynamics in the soil-plant-atmosphere continuum will be covered. Applications to agronomic and environmental problems and instrument design and use are considered through discussion and problems sets.

SCAS 663 Pedology

SCAS 666 Advanced Soil Microbiology
Fall. 1 credit. Prerequisite: SCAS 476 or permission of instructor. S-U grades only for graduate students. T 12:20. M. Alexander. Discussions of current topics in special areas of soil microbiology. Particular attention is given to biodegradation, bioremediation and fate of chemicals.

SCAS 667 Advanced Soil Physics
Spring. 3 credits. Prerequisites: One year of college physics and SCAS 483 or permission of instructor. S-U grades optional. Offered alternate years. Hours to be arranged. P. C. Baveye. A detailed study of measurement processes applied to the hydrodynamics of aqueous solutions in soils and porous media, with emphasis on fundamental principles. Examination of the molecular aspects of water-solid interactions, including shrink-swell phenomena and the properties of absorbed water. Analysis of equilibrium water adsorption from thermodynamical and mechanistic (molecular) standpoints. Mechanical and thermodynamical analysis of the equilibrium status of aqueous solutions in deformable soils. Formal lectures are complemented by tutorial sessions.

SCAS 669 Organic Matter—Soils, Sediments, and Waters
Spring. 2 or 3 (with discussion) credits. Prerequisites: SCAS 260 and CHEM 357–358 or equivalent. T R 9:05; disc, W 1:25–2:15. J. M. Duxbury. A discussion of current concepts on the chemical nature, dynamics, and properties of natural organics and organo-mineral associations in terrestrial and aquatic environments. Interaction with anthropogenic organics and effects of anthropogenic activities on natural organics are considered.

SCAS 671 Soil Chemistry
Fall. 3 credits. Prerequisite: one year of physical chemistry or permission of instructor. Offered alternate years. Next offered fall 1995 and 1997. Lecs, M W F 11:15. M. B. McBride. A detailed examination of the structure and surface chemistry of minerals common to soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays and oxides will be emphasized.

SCAS 675 Application of Soil-Plant-Air Models
Spring. 3 credits. Prerequisite: SCAS 483 or equivalent and COM S 100 or equivalent. Offered alternate years. Offered spring 1996. Lecs, T R 1:25–2:45. J. Riba, J. L. Hutson. Introduction to selection and use of soil-plant-atmosphere models. Topics covered will include problem analysis, general and specific types of models in current use, how to obtain and process data required to parameterize and drive models, and how to critically evaluate
and present model output. The course will use a case study approach in which different models are used to address a number of current agricultural and environmental problems. Strengths and weaknesses in the use of soil-plant-atmosphere models for teaching, research, extension and policy formation will be discussed.

SCAS 681 Soil Physics Research Seminar
Fall. 1 credit. Open to graduate students. P. C. Baveye, J. L. Hutson, H. van Es. Discussions of current topics in special areas of soil physics and presentation of research carried out by participants.

SCAS 693 Special Topics in Soil Science
Fall or spring. 1-6 credits. S-U grades optional. Study of topics in soil science that are more specialized or different from other courses. Special topics to be covered will depend on staff and student interests.

SCAS 880 Master's-Level Thesis Research in Soil Science
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students specifically in a master's program.

SCAS 980 Graduate-Level Dissertation Research in Soil Science
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students in a Ph.D. program only before the "A" exam has been passed.

SCAS 981 Doctoral-Level Dissertation Research in Soil Science
Fall or spring. Credit by arrangement. S-U grades only. Hours by arrangement. Graduate faculty. Limited to students admitted to candidacy after the "A" exam has been passed.

VEGETABLE CROPS

See Horticultural Sciences.

FACULTY ROSTER

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Brown, Dan L., Ph.D., Cornell U. Assoc. Prof., Animal Science
Brown, David L., Ph.D., U. of Wisconsin. Professor, Rural Sociology
Brown, Susan K., Ph.D., U. of California at Davis. Assoc. Prof., Horticultural Sciences (Geneva)
Bryant, Ray B., Ph.D., Purdue U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Burr, Thomas J., Ph.D., U. of California at Berkeley. Prof., Plant Pathology (Geneva)
Butler, Walter A., Ph.D., Purdue U. Assoc., Animal Science
Capps, Susan G., Ph.D., North Carolina State U. Asst. Prof., Agricultural and Biological Engineering
Carl森, William S., Ph.D., Stanford U. Assoc. Prof., Education
Casella, George, Ph.D., Purdue U. Prof., Plant Breeding and Biometry
Castillo-Chavez, Carlos, Ph.D., U. of Wisconsin. Assoc. Prof., Plant Breeding and Biometry
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Chase, Larry E., Ph.D., Pennsylvania State U. Assoc. Prof., Animal Science
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Coll, Royal D., Ph.D., Cornell U. Prof., Communication
Collmer, Alan R., Ph.D., Cornell U. Prof., Plant Pathology
Colucci, Stephen J., Ph.D., SUNY. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Confrey, Jere, Ph.D., Cornell U. Assoc. Prof., Education
Conneman, George J., Ph.D., Pennsylvania State U. Prof., Agricultural, Resource, and Managerial Economics
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Cooke, J. Robert, Ph.D., North Carolina State U. Prof., Agricultural and Biological Engineering
Cox, William J., Ph.D., Oregon State U. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
Cressey, Leroy L., Ph.D., U. of California at Davis. Prof., Fruit and Vegetable Science
Curnow, W. Bruce, Ph.D., Macquarie U. (Australia) Prof., Animal Science
Datta, Ashim K., Ph.D., U. of Florida. Assoc. Prof., Agricultural and Biological Engineering
Davis, Paula M., Ph.D., Iowa State U. Asst. Prof., Entomology
Decker, Daniel J., Ph.D., Cornell U. Assoc. Prof., Natural Resources
DeGloria, Stephen D., Ph.D., U. of California at Berkeley. Assoc. Prof., Soil, Crop, and Atmospheric Sciences
deGorter, Harry, Ph.D., U. of California at Berkeley. Assoc. Prof., Agricultural, Resource, and Managerial Economics
Delaney, Terrance, Ph.D., U. of Washington. Asst. Prof., Plant Pathology
<table>
<thead>
<tr>
<th>Name</th>
<th>University/Department</th>
<th>Title/Position</th>
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<tr>
<td>Liebherr, James K.</td>
<td>U. of California at Berkeley</td>
<td>Assoc. Prof., Entomology</td>
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<tr>
<td>Lisk, Donald J.</td>
<td>Cornell U.</td>
<td>Prof., Fruit and Vegetable Science</td>
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<td>Lorde, John, Ph.D.</td>
<td>U. of California at Berkeley</td>
<td>Assoc. Prof., Plant Pathology</td>
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<td>Loria, Rosemary M.S.</td>
<td>Michigan State U.</td>
<td>Assoc. Prof., Pathology</td>
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<td>Lucey, Robert F. Ph.D.</td>
<td>Michigan State U.</td>
<td>Assoc. Prof., Soil, Crop, and Atmospheric Sciences</td>
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<td>Lyson, Thomas A. Ph.D.</td>
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<td>McBride, Murray H. Ph.D.</td>
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<td>McCoosh, Susan D. Ph.D.</td>
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<td>Assoc. Prof., Plant Breeding and Biometry</td>
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<td>McCalloch, Charles E. Ph.D.</td>
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<td>McDonald, Daniel R. Ph.D.</td>
<td>University of Wisconsin</td>
<td>Assoc. Prof., Food Science and Technology (Geneva)</td>
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<td>Michael, Philip D. Ph.D.</td>
<td>SUNY Binghamton</td>
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<td>Malecki, Richard A. Ph.D.</td>
<td>University of Michigan</td>
<td>Assoc. Prof., Natural Resources</td>
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<td>Marshall, Alicia A. Ph.D.</td>
<td>Purdue U.</td>
<td>Assoc. Prof., Communication</td>
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<td>Merwin, Jan A. Ph.D.</td>
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<td>Miller, Dennis D. Ph.D.</td>
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<td>Milligan, Stephen A. Ph.D.</td>
<td>U. of California at Davis</td>
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<td>Miller, Jason, Ph.D.</td>
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<td>Moen, Aaron N. Ph.D.</td>
<td>University of Minnesota</td>
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<td>Monk, David H. Ph.D.</td>
<td>University of Chicago</td>
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<td>Morse, Roger A. Ph.D.</td>
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<td>Assoc. Prof., Entomology</td>
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<td>Mount, Timothy D. Ph.D.</td>
<td>U. of California at Berkeley</td>
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<td>Mower, Robert G. Ph.D.</td>
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<td>Assoc. Prof., Food Science</td>
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<td>Mutchler, Mary A. Ph.D.</td>
<td>University of Wisconsin</td>
<td>Assoc. Prof., Horticulture (Geneva)</td>
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<td>Neal, Joseph C. Ph.D.</td>
<td>North Carolina State U.</td>
<td>Assoc. Prof., Horticulture</td>
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<td>Nelson, Eric B. Ph.D.</td>
<td>Ohio State U.</td>
<td>Assoc. Prof., Plant Pathology</td>
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<td>Norvell, Wendell A. Ph.D.</td>
<td>Colorado State U.</td>
<td>Assoc. Prof., Soil, Crop, and Atmospheric Sciences</td>
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<td>Novak, Joseph D. Ph.D.</td>
<td>U. of Minnesota</td>
<td>Assoc. Prof., Education</td>
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<td>Novakovic, Andrew M. Ph.D.</td>
<td>Purdue U.</td>
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<td>Nyrop, Jan P. Ph.D.</td>
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<td>Obendorf, Ralph L. Ph.D.</td>
<td>U. of California at Davis</td>
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<td>Oglesby, Ray T. Ph.D.</td>
<td>U. of North Carolina</td>
<td>Assoc. Prof., Soil, Crop, and Atmospheric Sciences</td>
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<td>Olenacu, Elizabeth A. Ph.D.</td>
<td>U. of Minnesota</td>
<td>Assoc. Prof., Animal Science</td>
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<td>Olenacu, Rudi G. Ph.D.</td>
<td>U. of Minnesota</td>
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<td>Ostman, Ronald E. Ph.D.</td>
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<td>Palucki, Peter F. Ph.D.</td>
<td>U. of Adelaide</td>
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<td>Pardee, William D. Ph.D.</td>
<td>Cornell U.</td>
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<td>Parks, John E. Ph.D.</td>
<td>Virginia Polytechnic Inst.</td>
<td>Assoc. Prof., Animal Science</td>
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<td>Parlangue, J. Ph.D.</td>
<td>Brown U.</td>
<td>Assoc. Prof., Agricultural and Biological Engineering</td>
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<td>Patrican, Lisa A. Ph.D.</td>
<td>Wisconsin State U.</td>
<td>Assoc. Prof., Entomology</td>
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<td>Peckarsky, Barbara L. Ph.D.</td>
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<td>Assoc. Prof., Entomology</td>
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<td>Pell, Alice N. Ph.D.</td>
<td>U. of Vermont</td>
<td>Assoc. Prof., Animal Science</td>
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<td>Petrovic, A. Martin Ph.D.</td>
<td>Michigan State U.</td>
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<td>Poey, Gregory, Ph.D.</td>
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<td>Assoc. Prof., Agriculture, Resource, and Managerial Economics</td>
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<td>Pomer, Thomas T. Ph.D.</td>
<td>Stanford U.</td>
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<td>Pool, Robert M. Ph.D.</td>
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<td>Posner, George J. Ed.D.</td>
<td>SUNY at Albany</td>
<td>Assoc. Prof., Entomology</td>
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<td>Price, Hugh C. Ph.D.</td>
<td>Michigan State U.</td>
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<td>Pritts, Marvin P. Ph.D.</td>
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<td>Quaas, Richard L. Ph.D.</td>
<td>Colorado State U.</td>
<td>Assoc. Prof., Animal Science</td>
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<td>Reisch, Bruce, Ph.D.</td>
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<td>Reissig, William H. Ph.D.</td>
<td>Oregon State U.</td>
<td>Assoc. Prof., Entomology (Geneva)</td>
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<td>Richmond, Mila E. Ph.D.</td>
<td>U. of Missouri</td>
<td>Assoc. Prof., Natural Resources</td>
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<td>Riha, Susan J. Ph.D.</td>
<td>Washington State U.</td>
<td>Charles Lathrop Pack Professor, Assoc. Prof., Soil, Crop, and Atmospheric Sciences</td>
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<td>Ripple, Richard E. Ph.D.</td>
<td>U. of Wisconsin</td>
<td>Assoc. Prof., Education</td>
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<td>Rivzi, Seyit S. Ph.D.</td>
<td>Ohio State U.</td>
<td>Assoc. Prof., Food Science</td>
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<td>Robinson, Richard W. Ph.D.</td>
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<td>Robinson, Terence L. Ph.D.</td>
<td>Washington State U.</td>
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<tr>
<td>Roeof, Wendell L. Ph.D.</td>
<td>Indiana U. Liberty</td>
<td>Hyde Bailey Professor of Insect Biochemistry, Entomology (Geneva)</td>
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<td>Rosenberger, David A. Ph.D.</td>
<td>Michigan State U.</td>
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<td>Rutz, Donald A. Ph.D.</td>
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<td>Sanderson, John P. Ph.D.</td>
<td>California State U.</td>
<td>Assoc. Prof., Agriculture, Resource, and Managerial Economics</td>
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<td>Schwager, Steven J. Ph.D.</td>
<td>U. of California at Riverside</td>
<td>Assoc. Prof., Agriculture, Resource, and Managerial Economics</td>
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<td>Scherrer, Clifford W. Ph.D.</td>
<td>U. of Wisconsin</td>
<td>Assoc. Prof., Communication</td>
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<td>Schuling, Donald F. Ph.D.</td>
<td>Michigan State U.</td>
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<td>Scott, Jeffrey G. Ph.D.</td>
<td>University of California at Berkeley</td>
<td>Assoc. Prof., Entomology</td>
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<td>Schuman, Alan R. Ph.D.</td>
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<td>Seiber, Timothy L. Ph.D.</td>
<td>U. of Minnesota</td>
<td>Assoc. Prof., Soil, Crop, and Atmospheric Sciences</td>
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<tr>
<td>Shanahan, James E. Ph.D.</td>
<td>Massachusetts-Amherst</td>
<td>Assoc. Prof., Communication</td>
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<tr>
<td>Shapiro, Michael A. Ph.D.</td>
<td>U. of Wisconsin</td>
<td>Assoc. Prof., Communication</td>
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<tr>
<td>Sheltom, Anthony M. Ph.D.</td>
<td>U. of California at Riverside</td>
<td>Assoc. Prof., Horticulture (Geneva)</td>
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<tr>
<td>Shields, Elson J. Ph.D.</td>
<td>U. of Wisconsin</td>
<td>Assoc. Prof., Education</td>
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<tr>
<td>Sieczka, Joseph B. MS</td>
<td>Cornell U.</td>
<td>Assoc. Prof., Horticulture (Geneva)</td>
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<tr>
<td>Sinclair, Wayne A. Ph.D.</td>
<td>Cornell U.</td>
<td>Assoc. Prof., Plant Pathology</td>
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<td>Slack, Steven A. Ph.D.</td>
<td>University of California at Davis</td>
<td>Assoc. Prof., Plant Pathology</td>
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<td>Smith, Margaret E. Ph.D.</td>
<td>Stanford U.</td>
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<td>Smith, R. David. Ph.D.</td>
<td>Cornell U.</td>
<td>Assoc. Prof., Animal Science</td>
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<td>Sorrells, Mark E. Ph.D.</td>
<td>University of California at Berkeley</td>
<td>Assoc. Prof., Horticultural Sciences (Geneva)</td>
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<tr>
<td>Steenhus, Tammo S. Ph.D.</td>
<td>U. of Wisconsin</td>
<td>Assoc. Prof., Horticultural Sciences (Geneva)</td>
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<tr>
<td>Stiehler, Steven J. Ph.D.</td>
<td>University of Wisconsin</td>
<td>Assoc. Prof., Agricultural and Biological Engineering</td>
</tr>
</tbody>
</table>
ADMINISTRATION
William G. McMinn, dean
Stanley J. Bowman, associate dean
Laurie Roberts, director of public affairs
Cynthia K. Prescott, director of administrative operations
Ray Dalton, director of minority educational affairs
Jacquelyn Reed, acting director of minority educational affairs
Donna L. Kuhar, registrar
Elizabeth A. Cutter, director of admissions
Margaret Webster, curator of visual resources facility
Helen Johnson, director of career office

FACULTY ADVISERS
Architecture students are assigned faculty advisers for their first year. Underclass students have one assigned adviser but are encouraged to seek assistance and advice from the most appropriate faculty member or college officer.

First-year students in the fine arts department are assigned faculty advisers for the first year. Students may then choose advisers in their major area of concentration.

Undergraduate students in the Program of Urban and Regional Studies are assigned faculty advisers.

All students in the college are invited to share their concerns and seek advice from the volunteer student advisers at anytime.

Specific inquiries regarding rules, procedures, or deadlines should be addressed to:
Kent L. Hubbell, chair, Department of Architecture
Porus Olpadwala, chair, Department of City and Regional Planning
Jean Locey, chair, Department of Art.

DEGREE PROGRAMS

<table>
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<th>Program</th>
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<tr>
<td>Architecture</td>
<td>B.Arch.</td>
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<tr>
<td>Fine Arts</td>
<td>B.F.A.</td>
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<tr>
<td>History of Architecture and Urbanism</td>
<td>B.S.</td>
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<tr>
<td>Urban and Regional Studies</td>
<td>B.S.</td>
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</table>

The college offers programs leading to the bachelor’s degree—the five-year program in architecture leads to the Bachelor of Architecture; four-year programs in art and architecture lead to the Bachelor of Fine Arts. In addition, four-year programs with a concentration in either urban and regional studies or history of architecture lead to the Bachelor of Science.

Graduate-level programs are offered in art, architectural design and urban design, architectural sciences, history of architecture and urbanism, historic preservation planning, city and regional planning, regional science, and landscape architecture.

Students in each of these programs work in physical proximity to one another and thus gain a broader understanding of their own special area of interest through contact with the students and faculty in other disciplines.

Early in its development the college set a limit on the number of students it would enroll and devised a selective method of admission. There are now more than 650 students and a full-time teaching staff of over fifty-five, supplemented by visiting professors and critics, part-time lecturers, and assistants.

Teachers and students mix freely, and much instruction and criticism is on an individual basis.

The college’s courses are integral parts of the professional curricula. Fundamental subjects are taught by faculty members whose experience provides them with professional points of view. The concentration of professional courses within the college is balanced by the breadth of view gained from courses and informal learning in the rest of the university.

The college believes that this breadth is an essential element of professional education. This conviction is evident in the form of the curriculum, the methods of teaching, and the extracurricular life of teachers and students.

FACILITIES

The college occupies Sibley Hall, Olive Tjaden Hall, Rand Hall, and the Foundry. Facilities for architecture, and city and regional planning, as well as college administrative offices, the Visual Resources Facility, and the Fine Arts Library are located in Sibley Hall. The Department of Art is housed in Olive Tjaden Hall. Sculpture facilities are in the Foundry and shop facilities in Rand. The Green Dragon Cafe, a student eatery and lounge, is located in the basement of Sibley Dome. The college has three darkrooms that are available for general use by students in the college and serve as laboratories for the photography courses. A darkroom fee must be paid by each user. Information about darkroom rules and regulations, hours, and equipment is available at the darkroom circulation desk.

Through the generosity of the late Lillian P. Heller, the college also owns the Miller-Heller House, home of William H. Miller, the first student to enroll for the study of architecture at Cornell, and later a practicing architect in Ithaca. This building is used to house visiting teachers and guests of the college and for occasional receptions and social events.

Libraries

The Fine Arts Library, in Sibley Hall, serves the College of Architecture, Art, and Planning through its collections on architecture, fine arts, city and regional planning and landscape architecture. The library, with more than 150,000 books, is capable of supporting undergraduate, graduate, and research programs. Some 1,500 serials are currently received and maintained.

The Visual Resources Facility, made possible through gifts from George and Adelaide Knight, in Sibley Hall contains the F. M. Wells Memorial Slide Collection, which consists of a large and growing collection of slides of architecture, architectural history, and art. The collection now includes approximately 400,000 slides.

The facilities of the libraries of other schools and departments on campus and the John M. Olin Library, designed primarily as a research library for graduate students, are also available.

Museums and Galleries

The Herbert F. Johnson Museum of Art was formally opened in May 1973. Although many of its exhibitions and activities relate directly to academic programs of the university, the museum has no administrative affiliation with any department. In this way, its programs freely cross academic boundaries, stimulating interchange among disciplines. With a strong and varied collection and a continuous series of high-quality exhibitions, it fulfills its mission as a center for students, faculty, and staff in the College of Architecture, Art, and Planning and as a forum for the work of visiting artists. The museum, located in the John Hartell Gallery in Sibley Dome and in the Olive Tjaden Gallery in Olive Tjaden Hall.

Rome Program

The College of Architecture, Art, and Planning’s Rome Program was founded in the fall of 1986 to provide instruction in Italy for students seeking excellence in art, architecture, and other disciplines. The program offers an educational experience that draws upon the rich past of Rome, its resources in museums, its art and architecture, and its wide variety of cultural offerings. The school is located in the famous Palazzo Massimo in the center of the historical city next to such well-known Roman sights as Piazza Navona, the Pantheon, and Rome’s famous outdoor market at the Campo dei Fiori.

The program in Rome offers components for students majoring in liberal arts, architecture, fine arts, and planning. Full course loads are available to all students in a curriculum that stresses the convergence of artistic, cultural, and architectural ideas vital to an understanding of the city. Students are responsible for planning course schedules that ensure their
particular requirements can be met, since course offerings in Rome are limited. For additional information, see individual department listings.

COLLEGE ACADEMIC POLICIES

Ownership of Student Work
All drawings, models, paintings, graphic art, and sculpture done in the studios and drafting rooms as a part of the instructional program are the property of the college until they have been graded and released by the instructor. Certain works may be selected by the college for retention for academic purposes.

Exhibitions of Student Work
Exhibitions of student work are held each semester as part of the yearly schedule of the Olive Tjaden Hall gallery and the John Hartell Gallery. These galleries display work from a specific course or exhibit examples of recent work by individual faculty, students, and visitors.

Scholastic Standards
Term by term, a candidate for an undergraduate degree in the college is required to pass all courses in which the student is registered and have a weighted average for the term of not less than C (2.0). The record of each student who falls below the standard will be reviewed by the Student Records Committee for appropriate action, as described below:

1) Warning means that the student’s performance is below what is expected. Unless improvement is shown in the subsequent term, the student may be placed on final warning or required to take a leave of absence from the college.

2) Final Warning indicates that the student’s record is unsatisfactory. Unless considerable improvement is shown in the subsequent term, the student shall be required to take a leave of absence from the college.

3) Required leave of absence: Academic Deficiency. The student is dismissed from the college and may not continue studies in the college. A student who has been placed on a required leave of absence may apply for readmission after an absence of at least two semesters. Application for readmission is made by letter, addressed to the department chair. The student must submit evidence that his or her time has been well used, and, if employed, must submit a letter from an immediate superior. If a student chooses to register for courses, either extramurally at Cornell or at another institution, he or she should be advised that credit for these courses will not apply toward the degree but will appear on the student’s transcript. The grades received for any courses taken while on a required leave of absence will not be counted into the grade point average. Readmission to the college is at the discretion of the Admissions Committee. Application for spring-term readmission must be made by November 15, and application for fall-term readmission must be made by April 15. Refer to the Architecture, Art & Planning Handbook (Whitebook) for further information regarding required leave of absence.

4) Required withdrawal: May Not Reregister, College of Architecture, Art, and Planning. The student is dismissed from the college and is permanently prohibited from continuing in studies in it. This dismissal does not preclude the possibility of applying for admission to another division of the university.

The above actions are not necessarily sequential. A student who has received a warning may be placed on a required leave of absence for academic deficiency at the end of the next term if performance during that time is deemed to be grossly deficient. A cumulative average of at least C- (1.7) is required for graduation.

ARCHITECTURE

Professional Degree Program
The first professional degree in architecture is the Bachelor of Architecture. This degree counts toward the professional registration requirements established by the various states, National Architectural Accrediting Board, and the National Council of Architectural Registration Boards. The professional program is normally five years in length and is designed particularly for people who, before they apply, have established their interest and motivation to enter the field. It therefore incorporates a general and professional educational base.

The program is oriented toward developing the student’s ability to deal creatively with architectural problems on analytical, conceptual, and developmental levels. The sequence courses in design, consisting of studio work augmented by lectures and seminars dealing with theory and method, are the core of the program. Sequences of studies in the history of architecture and cities, culture and society, visual studies, environmental science, structures, and building technology provide a base for the work in design.

In the first three years the student has the opportunity to establish a foundation in the humanities and sciences through electives. During the fourth and fifth years this base may expand through detailed further studies in these areas. Within the professional program a basis for understanding architecture in its contemporary and historical cultural contexts is established.

The structure of the program incorporates considerable flexibility for the individual student to pursue his or her particular interest in the fourth and fifth years. By carefully planning options and electives in the fifth year, it is possible for a qualified student to apply the last year’s work for the Bachelor of Architecture degree to one of the graduate programs offered in the department. Some students are then able to complete the requirements for the master's degree in one additional year.

Rome Program
The program offers the opportunity for students from Cornell and other universities to spend one or two terms of study in Rome. This option is open to fourth- and fifth-year Cornell architecture students; outstanding third-year students are admitted by petition and a review of their design record. Courses offered by this department include design, thesis, thesis introduction, history, theory, architectural science, and visual studies. In addition, courses are offered by other departments in Italian language, Italian culture, and history of art. The program provides a unique urban and architectural experience drawing from the rich past of the city for sources of instruction and inspiration.

Overlap Program
For qualified students the department offers an option that combines the fifth year of the undergraduate program with the first year of the Master of Architecture program. In the fall of the fourth undergraduate year interested students petition the department to substitute Arch 601–602 or 603–604 for Arch 501–502. At the same time, they complete graduate school applications and submit them with fee and portfolio to the graduate field secretary for architecture. Students accepted into the program may not normally begin until the fall of their fifth year and, once enrolled, may not transfer back into the 501–502 sequence.

Following admission into the Overlap Program, students may petition to apply toward the requirements of the master’s degree a maximum of 30 credits, including Arch 601–602 or 603–604 and other advanced courses taken in excess of distribution requirements for the Bachelor of Architecture degree.

Curriculum

First Year

Fall Term

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>101 Design I</td>
<td>6</td>
</tr>
<tr>
<td>181 History of Architecture I</td>
<td>3</td>
</tr>
<tr>
<td>151 Drawing I</td>
<td>2</td>
</tr>
<tr>
<td>Math 111 Calculus or Math 106 or out-of-college elective</td>
<td>3–4</td>
</tr>
<tr>
<td>Out-of-college elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17–18</strong></td>
</tr>
</tbody>
</table>

Spring Term

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>102 Design II</td>
<td>6</td>
</tr>
<tr>
<td>182 History of Architecture II</td>
<td>3</td>
</tr>
<tr>
<td>152 Drawing II</td>
<td>2</td>
</tr>
<tr>
<td>Math 111 or out-of-college elective</td>
<td>3–4</td>
</tr>
<tr>
<td>Out-of-college elective (freshman writing seminar suggested)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17–18</strong></td>
</tr>
</tbody>
</table>

Second Year

Fall Term

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>201 Design III</td>
<td>6</td>
</tr>
<tr>
<td>263 Structural Concepts</td>
<td>4</td>
</tr>
<tr>
<td>231 Architectural Analysis I</td>
<td>2</td>
</tr>
</tbody>
</table>
Transfer Students

Although the program leading to the Bachelor of Architecture is specifically directed to those who are strongly motivated to begin professional study when entering college, it is sufficiently flexible to allow transfers for students who have not made this decision until after they have been in another program for one or two years. Individuals who have already completed a nonprofessional undergraduate degree must also apply to transfer to the Bachelor of Architecture degree program, since the graduate program in architecture requires the Bachelor of Architecture degree or its equivalent for entrance.

Transfer students are responsible for completing that portion of the curriculum that has not been covered by equivalent work. Applicants who have had no previous work in architectural design must complete the ten-term design sequence. Since this sequence may be accelerated by attending summer terms, seven or eight regular terms and two or three summer terms are typically required.

For those who would benefit from an opportunity to explore the field of architecture before deciding on a commitment to professional education, the department offers an introductory summer program that includes an introductory studio in architectural design, lectures, and other experiences designed to acquaint the participants with opportunities, issues, and methods in the field of architecture.

Admission is offered to a limited number of transfer applicants who have completed a portion of their architecture studies in other schools. Each applicant's case is considered individually. Transfer students must complete a minimum of 70 credits and four terms in residence, taking 35 of the 70 credits (including four terms of design) in the Department of Architecture. Placement in the design sequence is based on a review of a representative portfolio of previous work.

Alternative Programs

Bachelor of Fine Arts

After completing the first four years of requirements, the student may choose to receive the degree of Bachelor of Fine Arts (B.F.A.) in architecture, which is not a professional degree.

Bachelor of Science in History of Architecture

The history of architecture major leads to a Bachelor of Science degree, conferred by the College of Architecture, Art, and Planning. The major is intended for transfer students from other programs at Cornell and from colleges and universities outside Cornell. Students in the Department of Architecture and the College of Arts and Sciences may take the major as part of a dual-degree program.

The course of study in this major, available to students from a variety of academic backgrounds, offers the opportunity for a vigorous exploration of architecture and its history.

Admission requirements. Two years of undergraduate study, Arch 181 and 182 or the equivalent. Students transferring from a B.Arch. program must be in good standing in their design sequence.
Applications may be considered after this date to discuss scheduling for the program. Students who wish to transfer to the program from outside Cornell must apply to the Department of Architecture by March 15. Applications may be considered after this date but are given lower priority. Applications for both internal and external transfer students are available from Elizabeth Cutter, Admissions Office, College of Architecture, Art, and Planning, Cornell University, 135 East Sibley Hall, Ithaca, New York 14853-6701.

Curriculum. A student entering the program is assigned an adviser from the history of architecture faculty in the Department of Architecture. Adviser and student together prepare an appropriate two-year course of study according to the following guidelines:

1) 24 credits of 300-level courses in architectural history: Arch 380 through Arch 399
2) 12 credits in 600-level architectural history seminars: Arch 681 through Arch 699; or 8 credits in a 600-level seminar plus Arch 499, offered for honors candidates only
3) One 300-, 400-, or 600-level course in architectural theory
4) 24 credits in electives selected in consultation with the student’s adviser
5) Language requirement, to be met in the manner specified for students enrolled in the College of Arts and Sciences

Honors program. Students will graduate with honors if, during their two years of study in the program, they have a cumulative average of B or better in all courses, have no grade lower than A- in all history of architecture courses taken at the 300 level, and have completed an honors thesis (Arch 499) deemed to be of distinguished quality by the history of architecture faculty.

Dual Degree Options
Students can earn both the B.S. and B.Arch. degrees either simultaneously or sequentially. Students who have transferred into the B.Arch. program at Cornell may find this to be a special opportunity for an enlarged and enriched program of study.

Students currently enrolled in the College of Arts and Sciences at Cornell can earn a B.A. in an arts college major and a B.S. in the history of architecture in five years. In this option, students complete a minimum of 150 credits, which include all of the B.A. prerequisites and curriculum requirements and 100 credits of the usual distribution and major requirements in the College of Arts and Sciences. Further information about this option is available at the Office of Undergraduate Admissions, College of Arts and Sciences, 55 Goldwin Smith Hall.

Students may also elect to continue toward a Master of Arts degree in the history of architecture. The M.A. ordinarily requires a minimum of two years of graduate work beyond the bachelor's degree; with this special sequential degree arrangement that time is shortened to one year.

Summer Term in Architecture
The summer term offers students the opportunity of an intensified period of design work. Design is offered at both undergraduate and graduate levels; the term is six to eight weeks in duration.

Undergraduate design sequence courses, including thesis, are offered at first- through fifth-year levels in Ithaca. Normally there is also a design program abroad for third-, fourth-, and fifth-year students.

Students from schools of architecture other than Cornell are welcome to apply to enroll in any summer program.

At the graduate level participation in the summer program cannot be undertaken without the consent of the student’s Special Committee.

Furniture design, architectural structures, and computer visualization may be offered as elective courses, contingent upon student interest and faculty availability.

The department offers a Career Discovery Program in Architecture for high school students and undergraduates interested in exploring the possibility of a career in architecture.

Architectural Design Courses
Courses in brackets are not offered this year. A studio fee of $65 is charged each semester for every design course (these fees are subject to change).

Sequence Courses
ARCH 101 Design I
Fall. 6 credits. Limited to department students. An introduction to design as a conceptual discipline directed at the analysis, interpretation, synthesis, and transformation of the physical environment. Exercises are aimed at developing an understanding of the issues, elements, and processes of environmental design.

ARCH 102 Design II
Spring. 6 credits. Limited to department students. Prerequisite: Architecture 101. A continuation of Architecture 101. Human, social, technical, and aesthetic factors related to space and form. Design problems range from those of the immediate environment of the individual to that of small social groups.

ARCH 201-202 Design III and IV
Fall and spring. 6 credits each term. Coregistration in Architecture 231-232 and completion of Architecture 151-152 required. Limited to department students. Prerequisite for Architecture 201 is Architecture 102 and Architecture 152. Prerequisite for Architecture 202 is Architecture 201.

ARCH 301-302 Design V and VI
Fall and spring. 6 credits each term. Limited to department students. Prerequisite for Architecture 301 is Architecture 202. Prerequisite for Architecture 302 is Architecture 301.

Prerequisites
ARCH 401-402 Design and VIII
Fall and spring. 6 credits each term. Limited to department students. Prerequisite for Architecture 401 is Architecture 202. Prerequisite for Architecture 402 is Architecture 401. Programs in architectural design, urban design, or architectural technology and environmental science, etc.

ARCH 501 Design IX
Fall or spring. 6 credits. Limited to department students. Prerequisite: Architecture 402.

ARCH 601-602 Special Program in Architectural Design
Fall and spring. 9 credits each term. Limited to students who have been accepted into the Overlap Program. Registration by petition only.

ARCH 603-604 Special Program in Urban Design
Fall and spring. 9 credits each term. Limited to students who have been accepted into the Overlap Program. Registration by petition only.

Graduate Courses
ARCH 701-702 Problems in Architectural Design
Fall and spring. 9 credits each term. Basic first-year design course for graduate students whose major concentration is architectural design.

ARCH 703-704 Problems in Urban Design
Fall and spring. 9 credits each term. Basic first-year design course for graduate students whose major concentration is urban design.

ARCH 801 Thesis or Research in Architectural Design
Fall or spring. 8 credits. Prerequisite: Architecture 701 and Architecture 702. Second-year design course for graduate students whose major concentration is architectural design.

ARCH 802 Thesis or Research in Urban Design
Fall or spring. 9 credits. Prerequisite: Architecture 703 and Architecture 704. Second-year design course for graduate students whose major concentration is regional design.

Elective Design Courses
ARCH 103-104 Elective Design Studio
103, fall; 104, spring. 6 credits each term. Limited to students from outside the department. Prerequisite for Architecture 103: permission of instructor. Prerequisite for Architecture 104: Architecture 103 and permission of instructor.
ARCH 303 Special Problems in Architectural Design
Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor and approved independent study form. Independent study.

ARCH 200, 300, 400, 500 Elective Design
Fall or spring. 6 credits each term. Open by permission to transfer students who have not been assigned to a sequence course. Prerequisite: permission of department office. Each student is assigned to a class of appropriate level. Prerequisite for Architecture 500 is Architecture 402.

ARCH 605 Special Problems in Design
Fall and spring. Variable credit (maximum 3). Prerequisite: permission of instructor. Independent study.

Related Courses and Seminars
ARCH 110 Introduction to Architecture: Design Studio
Summer session. 3 credits. S-U option. Open to non-architectural majors in college, high school students in 11th and 12th grades, and any individuals with a minimum of a high school diploma interested in exploring the field of architecture. Not offered every year. A course designed to introduce students to ideas, principles, and methods of solving architectural problems in a studio setting. Through a graduated sequence of exercises culminating in a major term project, students explore the architectural concepts of space, form, function, and technology. Instruction is via highly personalized critiques of individual student work by assigned department faculty as well as by periodic reviews of group by invited faculty and guest critics. The course grade is based on the overall performance in the studio with special emphasis on the quality of a major studio project.

ARCH 111 An Introduction to Architectural Design
Fall or spring. 4 credits. Open to out-of-department students only. Not offered 1995-96. An introduction to architectural design as a conceptual discipline. Exercises will develop an understanding of architectural space and its elements.

ARCH 317 Contemporary Italian Culture
Fall or spring. Variable credit (maximum, 3). For students in the Rome program only. This course provides a broad view of the culture and social structure of Italy, drawing from Italian literature, history, and current events.

ARCH 411 Professional Practice
Fall or spring. 3 credits each term. An examination of organizational and management theories and practices for delivering professional design services. Included is a historic overview of the profession and a review of the architect's responsibilities from the precontract phase through construction. Application of computer technology in preparing specifications.

ARCH 510 Thesis Introduction
Foreign summer programs and Rome program only. 3 credits. Must be taken in conjunction with Architecture 500. Prerequisite for Architecture 500 is Architecture 402. Architecture 500 will be considered equivalent to Architecture 501 when taken concurrently with Architecture 510 during a foreign summer program or in Rome. Lectures, seminars, and independent research leading to complete development of the student's thesis program. General instruction in the definition, programming, and development of a thesis.

ARCH 610 Graduate Design Seminar
Fall. 3 credits. Intended for but not limited to graduate students in the Architectural Design and Urban Design Program. Issues in architectural and urban design. Required for first-year graduate students in design.

ARCH 611-612 Urban Housing Developments
611, fall; 612, spring. 3 credits each term. Limited to fifth-year students in architecture and graduate students. Prerequisite: permission of instructor. Not offered every year.

ARCH 613 Transportation
Fall. 3 credits. Prerequisite: permission of instructor. Not offered every year. The impact of various transportation forms on the environment is considered from the perspectives of architects, engineers, planners, and human ecologists. Readings and discussions of past, current, and future transportation modes focus on aesthetic and physical aspects.

ARCH 614 Low-Cost Housing
Spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Aspects of low-cost housing involving engineering technology, architecture, physical planning, economics, and sociology.

ARCH 618-619 Seminar in Urban and Regional Design
618, fall; 619, spring. 3 credits each term. Limited to fifth-year and graduate students. Not offered every year. A broad range of issues and problems of urban and regional development and the context in which the designer functions are surveyed. Selected case studies are presented by the participants and visitors.

Architectural Theory
ARCH 130 An Introduction to Architecture: Lecture Series
Summer. 3 credits. S-U option. Open to non-architectural majors in college, high school students in 11th and 12th grades, and any individuals with a minimum of a high school diploma interested in exploring the field of architecture. Not offered every year. A survey course that covers the many facets of architecture: history, design principles, preservation, landscape architecture, building technology, and cultural factors. The format of the course comprises lectures, demonstrations, films, and field trips. Course evaluation is based on quizzes and a final examination.

ARCH 131 An Introduction to Architecture
Fall. 3 credits. Open to out-of-department students only. Architecture 131 is not a prerequisite for Architecture 132. Intended to familiarize non-architecture students with the discipline of architecture. Fundamentals of plan, section, and elevation, the primary elements that comprise an architectural form; basic organizational principles; the ways in which we perceive architectural space; and the various concepts of function in relation to form will be included among the topics to be covered, using examples from numerous times and cultures as well as from the contemporary Cornell campus.

ARCH 132 An Introduction to Architecture
Spring. 3 credits. Open to out-of-department students only. Architecture 131 is not a prerequisite for Architecture 132. Non-architecture students are initiated into various types of architectural drawings and exposed to a variety of methods whereby architectural forms communicate both simple and complex meanings. Architecture in its relation to fields such as landscape architecture, urban design, structural design, interior design, set design, architectural history, preservation, and computer graphics will be included in the presentations, which will also deal with the various relationships established between an architect and a society. Cross-historical and cross-cultural examples will be used in developing the student a degree of fluency in the languages of architectural discourse.

ARCH 231 Architectural Analysis I
Fall. 2 credits. Architecture students must register concurrently in Architecture 201. An introduction to analysis of the object of study in the interest of broadening one's understandings of the ways in which architecture can connote and denote meanings.

ARCH 232 Architectural Analysis II
Spring. 2 credits. Architecture students must register for this course concurrently with Architecture 202. Advanced analytical studies focusing on complex architectural spaces, objects, images, and representations.

ARCH 335 Theory of Architecture
Fall or spring. 3 credits. Prerequisite: Architecture 231-232 or permission of instructor. Not offered every year.

ARCH 336 Theory of Architecture
Fall or spring. 3 credits. Limited to third-year students and above. Not offered every year. Theories of modern architecture: De Stijl, cubist and purist painting, industrialized architecture, Le Corbusier's architecture and urban theories, architectural sequence, facades, the free plan, "DOMINO" theory.

ARCH 337 Special Investigations in the Theory of Architecture I
Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor and approved independent study form. Independent study.
ARCH 338 Special Topics in the Theory of Architecture I
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. Topic to be announced before preregistration.

ARCH 339 Elements, Principles, and Theories in Japanese Architecture
Spring. 3 credits. Not offered every year. An examination of Japanese architecture—buildings and gardens—and their contexts—landscapes, settlements, and cities. The course is limited to those interested in Japanese architecture as a manifestation of Japanese culture and as a subject for analysis. Emphasis is on underlying concepts, ordering principles, formal typologies, space and its representation, perceptual phenomena, and symbolic content. Readings focus on theoretical treatments of these aspects by Japanese and western writers.

ARCH 431 Theory of Architecture
Fall. 3 credits. Prerequisite: third-year status. Not offered every year. Gardening and architecture: urban parks; villas and country houses; and Italian, French, and English landscape gardens. Site planning.

ARCH 432 Theory of Architecture
Spring. 3 credits. Prerequisite: third-year status. Not offered every year. The development of urban form, urban intervention, contextualism, ideal cities, historic new towns, streets, piazzas, fortifications, public buildings and social housing types, site planning, and transportation.

ARCH 435 Architecture and Representation
Fall. 3 credits. Limited to degree candidates in architecture. Prerequisite: successful completion of Architecture 251-252. Not offered every year. A study of architecture as it functions as a representational art, referring to its past while inferring its present.

ARCH 635 Critical Theory in Architecture
Spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. This course focuses on traditional societies in which beliefs about architectural order are born out of the mythic and religious imagination. Certain themes that are common to a range of cultures are explored in detail. They include the model of the human body as a source of architectural knowledge, the sacred center, the cosmic mountain, and architectural rituals as enactments of myths. Such themes are traced across cultures, through time and into contemporary theory.

ARCH 644 The Indian Example and the Visual Tradition in Culture
Spring. 3 credits. Prerequisite: permission of instructor. Not offered every year. This course explores the relationship between architectural traditions of Hindu India and explores the relationship between form and more general beliefs about the power of vision to reveal and transform. Topics include the sculptural program of the Hindu temple as a vehicle for the preservation and transmission of mythic texts, the oculus as an element and the eye as a motif, darshan, the spiritually transforming vision, and the destructive power of vision as revealed in myth and beliefs about "evil eye."

Fall. 367; spring. 648 spring. 4 credits each term. Prerequisite: permission of instructor. Not offered every year. Fall term, theory; spring term, problem solving and method. An examination of the relationship between architecture and other aspects of culture. Emphasis on the motivations for particular architectural forms and especially on theories of architecture. Examples from the United States and Asia.

ARCH 649 Graduate Investigations in Architecture, Culture, and Society
Fall or spring. Variable credit (maximum 4). Prerequisite: permission of instructor and approved independent study form. Independent study.

Visual Studies
Darkroom fees charged for all photography courses.

ARCH 151 Drawing I
Fall. 2 credits. Freehand drawing with emphasis on line and perspective representation of form and space.

ARCH 152 Drawing II
Spring. 2 credits. Prerequisite: Architecture 151. Freeland drawing as a means of conceiving and expressing spatial form; line weight, shades and shadows, and figure drawing.

ARCH 251 Introductory Photo I (also Art 161)
Fall or spring. 3 credits each term. For description see Art 161.

ARCH 351 Photography II (also Art 261)
Spring. 4 credits. Prerequisites: Architecture 251 or Art 161, or permission of instructor. For description see Art 261.

ARCH 450 Architectural Publications
Fall and spring. Variable credit (maximum 3). May be repeated for credit. Colloquy and practicum on issues related to the production of an architectural journal, as well as other theoretical and practical production related to the exchange of...
architectural ideas. Exercises will cover both theoretical as well as hands-on aspects of architectural publication.

ARCH 457 Special Project in Photography
Fall or spring. Variable credit (maximum, 3). Prerequisites: written proposal outlining the special project and permission of instructor. Not offered every year. Independent study.

ARCH 458 Special Investigations in Visual Studies
Fall or spring. Variable credit (maximum, 3). Prerequisites: permission of instructor and approved independent study form. Independent study.

ARCH 459 Special Topics in Visual Studies I
Fall or spring. 3 credits. Prerequisite: permission of instructor. Topics to be announced before preregistration.

ARCH 658 Special Investigations in Visual Studies II
Fall or spring. Variable credit (maximum, 4). Prerequisites: permission of instructor and approved independent study form. Independent study.

ARCH 659 Special Topics in Visual Studies II
Fall or spring. 3 credits. Prerequisite: permission of instructor. Topic to be announced before preregistration.

Architectural Science and Technology Structures

ARCH 263 Structural Concepts
Fall. 4 credits. Prerequisite: Mathematics 111 or approved equivalent. Fundamental concepts of structural behavior. Statics and strength of materials. Introduction to and analysis of simple structural systems.

ARCH 264 Structural Elements
Spring. 3 credits. Prerequisite: Architecture 263. Concepts and procedures for the design of individual structural components (columns, beams, etc.) in steel, concrete, and timber construction.

ARCH 363 Structural Systems
Fall. 3 credits. Prerequisite: Architecture 264. Concepts and procedures for the design of overall structural framing systems in steel, concrete, and timber construction.

ARCH 463 Special Topics in Structures
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 263, 264, and 363 or permission of instructor. Not offered every year. Topic to be announced by preregistration.

ARCH 473 Special Investigations in Structures
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Independent study.

Construction

[ARCH 160 The History of Architectural Technology
Fall or spring. 3 credits. Not for students in the Department of Architecture. Not offered 1995-96.

Architectural technology is a seemingly illogical blend of scientific knowledge and empirical experience. Whereas it may seem chaotic to the nonprofessional, it is a product of logic in the widely differing areas of design, structure, installation, production and erection, material use, life, economics, and historical development. The evolution of this interdependence is treated using examples of architectural and civil engineering works and processes.]

[ARCH 161 An Introduction to Building Technology
Fall. 3 credits. Open to out-of-department students only. Not offered 1995-96.

An introduction to building technology, materials, and construction systems for non-architecture majors. Topics will include structure (why buildings stand up); enclosure (mediation of environmental conditions); mechanical systems (how buildings provide comfort, hygiene, and life safety); and interior surfaces (walls, floors, ceilings, acoustical behavior, and fire safety). The relationship between the principles and practices underlying the construction of buildings ("technology") and what buildings look like ("design") will also be explored. Concepts rather than computation will be emphasized.

ARCH 262 Building Technology, Materials, and Methods
Spring. 3 credits. Properties of materials—their use and application to the design of buildings and building systems. Discussion of various methods of building construction and assembly. Reference will be made to third-year students and above. Not offered every year. Topic to be announced by preregistration.

ARCH 465 Special Topics in Construction
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 262 or permission of instructor. Not offered every year. Topic to be announced by preregistration.

ARCH 475 Special Investigations in Construction
Fall or spring. Variable credit (maximum 3). Prerequisite: permission of instructor and approved independent study form. Independent study.

Environmental Controls

ARCH 261 Environmental Controls—Site Planning
Fall. 3 credits. The basic principles involved in design in the outdoor environment. A brief historical perspective. A development of inventory including grading and drainage. Foundations, surfacing, and construction.

ARCH 361 Environmental Controls—Lighting and Acoustics
Fall. 3 credits. Basic properties and principles of sound and light. Sound phenomena, noise control, absorption, acoustical design. Light, color, and form. Natural lighting possibilities and constraints. Good and bad examples of artificial lighting.

ARCH 362 Environmental Controls—Mechanical and Passive Solar Systems
Spring. 3 credits. Basic thermal analysis of buildings. Human comfort criteria, energy conservation, passive solar design, HVAC distribution systems, overview of mechanical conveying systems and plumbing.

ARCH 464 Special Topics in Environmental Controls
Fall or spring. 3 credits. Limited to 30 students. Prerequisites: Architecture 261, 361, and 362 or permission of instructor. Not offered every year. Topic to be announced by preregistration.

ARCH 474 Special Investigations in Environmental Controls
Fall or spring. Variable credit (maximum 3). Prerequisites: written proposal and approved independent study form. Independent study.

Computer Applications

ARCH 372 Imaging and the Electronic Age
Spring. 3 credits. For undergraduate, non-computer-scientists. 2 lectures. 1 recitation. D. Greenberg.

Historical technological advances which created major paradigm shifts for communications as well as advances in computer technology will be presented. Technical fundamentals of computer graphics capabilities will be emphasized. The latter half of the course will cover the effect of these scientific advances on many discipline-specific areas including architecture, art and animation, photography and the film industry, medicine, engineering design, the corporate structure, and education itself. The course will be heavily supplemented with pictorial content consisting of slides, movies, and live interactive demonstrations.

ARCH 374 Computer Graphics and Visualization
For description, see Computer Science 417.

ARCH 375 Practicum in Computer Graphics (also Computer Science 418)
Spring. 2 credits. Prerequisite: Computer Science 211. Recommended: Computer Science 314. Corequisite: Architecture 374. Not offered every year. Two or three programming assignments dealing with sophisticated interactive vector graphics programs on calligraphic displays and solid-image generation on raster graphics displays.

ARCH 378 Computers in Architecture Seminar
Fall or spring. 3 credits. Prerequisites: Computer Science 100 or permission of instructor. Not offered every year. Exploration of the use of computers in a variety of ways encompassing architectural practice and education. Use of the computer is not required for this course.

ARCH 379 Design by Computer
Spring. 3 credits. Prerequisites: Limited to third-year students and above. Not offered every year. Exploration of the formalization of the design process for compatibility with the computer, and the role of computers in design. Lecture with CAD lab.
The history of the built environment as social and cultural expression from the earliest to the present day. Particular attention will be given to the present day. Particular attention will be given to the present day. Particular attention will be given to the present day. Particular attention will be given to the present day. Particular attention will be given to the present day.

**Directed Electives**

**ARCH 380 History of Theory**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

This course, in which classroom discussion and debate play a central role, explores the history of important theoretical issues involving art and architecture. The readings, which span from the Greeks to today, focus on more than just questions of aesthetics and include theories of ethics, origins, imagination, nature, society, and pedagogy.

**ARCH 381 Greek and Roman Architecture and Urbanism**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

The history of architecture and urban design in ancient Mediterranean civilizations, with emphasis on Greece and Rome. The course considers change and transformation of building types and their elements within the general context of social demands.

**ARCH 382 Architecture of the Middle Ages**
Fall. 4 credits. Prerequisites: Architecture 181-182 or permission of instructor. Credit for this course may be obtained by taking History of Art 532. Not offered every year.

A survey of medieval architecture from the Early Christian period to the late Gothic (A.D. 300-1500). Emphasis is given to the development of structural systems, form, function, and meaning of important medieval buildings.

**ARCH 383 The City**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

This course looks at the development of urban form and urban consciousness from the bronze age to the industrial revolution. It studies conceptions of the city, competing urban paradigms, images of cities both real and fictive, as well as the religious and cultural practices associated with city design.

**ARCH 384 The Italian Renaissance: Architecture, Politics, and Urbanism**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

This course focuses on the leading architects and theorists of the Renaissance from within the context of the political and cultural developments in Italy from 1300 to the mid-sixteenth century. The course also investigates specific architectural problems faced by designers as well as questions of architectural patronage, practices, and theories.

**ARCH 385 Magnificent Utility—Architecture and the Arts of Persuasion**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

Architects put revolutionary attitudes about form, space, light, and the arts into practice during the course of the seventeenth century. Focusing on the urban centers of Rome and Paris and the cultural landscapes of Spain, England, and Central Europe, this course explores how architecture, urban design, and the arts were employed to promote state and church.

**ARCH 386 Modernism**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

From early eighteenth to early nineteenth century, European society underwent profound change. Political absolutism—the doctrine of unlimited government control—was challenged; Enlightenment attitudes—commitments to human reason, science and education—gained ascendancy. This course considers architectural and urban design in these times of tumult. It begins with efforts to formalize architectural revolution within inherited traditions and ends with attempts to establish design traditions within revolutionary settings.

**ARCH 387 The Nineteenth Century—Style, Technology, and Individuality in the West**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

An examination of the nineteenth-century efforts to create appropriate stylistic forms and expressions for emerging building technologies and typologies. The preservation of individual artistic expression against the backdrop of industrialization, urbanization, and professionalization will be emphasized. The course begins with Rationalist theory and its architectural expression and concludes with considerations of Art Nouveau, Modernismo, and Jugendstil.

**ARCH 389 Architecture, Revolution and Tradition**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

A review of architecture, building, and responses to the landscape from the prehistoric period to the Civil War. Architecture and building as social and collaborative arts will be emphasized and thus the contributions of artisans, clients, and users as well as professional architects and builders will be examined. The architectural expressions of Native Americans, African Americans, women, and others will be treated in addition to those of European colonists and settlers.

**ARCH 390 American Architecture and Building I**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

A review of architecture, building, and responses to the landscape from the prehistoric period to the Civil War. Architecture and building as social and collaborative arts will be emphasized and thus the contributions of artisans, clients, and users as well as professional architects and builders will be examined. The architectural expressions of Native Americans, African Americans, women, and others will be treated in addition to those of European colonists and settlers.

**ARCH 391 American Architecture and Building II**
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.

A continuation of Architecture 390 but may be taken independently. An account of American architectural history, buildings, and responses to the environment from the post-Civil War period to the present day. Particular attention will be paid to the processes of industrialization, professionalization, and urbanization as well
as to the manifestations of gender, class, race, and ethnicity in the built and architectural environments.

ARCH 392 Modern Architecture On Film
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.
An exploration of the themes deemed critical to modern architecture and urbanism, through their representation in both commercial and avant-garde films from the medium's birth until the present day. The focus will vary each semester with particular emphasis to include the modern house and housing, the modern city, technology and visions of the future, and finally the image of the architect. Representations of these themes in other forms such as painting, photography, theatre, literature, and advertising will also be examined. Selected readings in modern architecture and film, screenings in class, class discussions, presentations, and papers.

ARCH 393 The Cumulative City
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.
Well established cities were transformed by radical and unimagined change in the last half of the twentieth century. Politics and economies were recast, populations exploded, and new technologies reshaped transportation, communication, and building. This course explores transformation historically in the cumulative city, focusing on specific cities in America and Europe, Africa, and Asia. The cultural context of each city is examined to understand how it changed and how meanings became associated with evolving urban forms.

ARCH 394 Toward the Millennium
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.
The theory and practice in architecture and urbanism are investigated from the 1950s to the present. From the Americanized International Style to the recent internationalism of design attitudes, the immediate past is explored historically to probe the matrix of meanings associated with contemporary form, urbanism, and technology.

ARCH 395 Contemporary Issues in the Built Environment
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.
A consideration of how certain social, cultural, political, ethical, and economic issues are manifest in the architectural and built environments of the United States. Overarching issues will be examined through case studies such as the question of monuments, and monumentality in a contemporary, multicultural society through the Vietnam Memorial in Washington, D.C., Holocaust museums and memorials, and the preservation of the Audubon Ballroom as a memorial to Malcolm X. Historical concerns and examples will be brought to bear on these contemporary manifestations of preservation, monumentality, gender, class, professional responsibility, and ethics and design as a collaborative art. A course for architects, planners, and preservationists but also clients and users of buildings and landscape.

ARCH 396 Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.
Topic to be announced.

ARCH 397 Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.
Topic to be announced.

ARCH 398 Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.
Topic to be announced.

ARCH 399 Special Topics in the History of Architecture and Urbanism
Fall or spring. 3 credits. Prerequisites: Architecture 181-182 or permission of instructor. Not offered every year.
Topic to be announced.

Coursus in Preservation
ARC 583 Measured Drawing
For description, see CRP 567.
ARC 584 Problems in Contemporary Preservation Practice
For description, see CRP 563.
ARC 585 Perspectives on Preservation
For description, see CRP 562.
ARC 586 Documentation for Preservation
For description, see CRP 560.
ARC 587 Building Materials Conservation
For description, see CRP 564.
ARC 588 Historic Preservation Planning Workshop: Surveys and Analyses
For description, see CRP 561.

Graduate Seminars in the History of Architecture and Urbanism
ARCH 680 Seminar in Historiography
Fall. 4 credits. Prerequisite: permission of instructor.
Historiographic and methodological issues are examined in relation to the history of architecture and urbanism. Taught by different faculty members in successive years, the seminar is required of all first- and second-year graduate students in the History of Architecture and Urbanism program.
ARCH 682 Seminar in Urban History
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 683 Seminar in the History of Theory
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 684 Seminar in the Italian Renaissance: Architecture, Politics, and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 685 Seminar in Seventeenth- and Eighteenth-Century Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 686 Seminar in Twentieth-Century Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 689 Seminar in the History of Cities
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 690 Seminar in American Architecture, Building, and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 692 Seminar in Nineteenth-Century Architecture, Building, and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 698 Seminar in Special Topics in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 697 Seminar in Special Topics in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 698 Seminar in Special Topics in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 699 Seminar in Special Topics in the History of Architecture and Urbanism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered every year.
Topic to be announced.

ARCH 299 Undergraduate Dissertation
Fall or spring. Variable credit (maximum, 3). Prerequisite: permission of instructor. May not be taken by students in design to satisfy undergraduate history requirements. Independent study for undergraduate students.
ARCH 499 Undergraduate Thesis in the History of Architecture and Urbanism
Fall or spring. 4 credits. For B.S. honors candidates in history only.

ARCH 799 Graduate Independent Study in the History of Architecture and Urbanism
Fall or spring. Variable credit. Prerequisite: permission of instructor. Independent study for graduate students.

ARCH 899 M.A. Essay in the History of Architecture and Urbanism
Fall or spring. 4 credits. Independent preparation of the M.A. essay, often developed from topics investigated in Arch 689.

ARCH 999 Ph.D. Dissertation in the History of Architecture and Urbanism
Fall or spring. Variable credit. Independent study for the doctoral degree.

ART

Undergraduate Program
The undergraduate curriculum in art, leading to the degree of Bachelor of Fine Arts, provides an opportunity for the student to combine a general liberal education with the studio concentration required for a professional degree. During the first three semesters all students follow a common course of study designed to provide a broad introduction to the arts and a basis for the intensive studio experience in the last three years. Beginning with the third year, students concentrate in painting, sculpture, photography, or printmaking.

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 a program of study within the College of Architecture, Art, and Planning. 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.

The undergraduate curriculum in art is an excellent background for a career in applied art although no specific technical courses are offered in such areas as interior design, fashion, or commercial art.

All members of the faculty in the Department of Art are active, practicing artists, whose work represents a broad range of expression.

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 in the second or in some cases, the third year. Interested students should consult with their academic adviser. 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.

Bachelor of Fine Arts Degree Requirements

Credits and Distribution
130 credits are required for the BFA degree. A minimum of 67 are taken in the Department of Art and an additional 6 credits of Survey of World Art. A minimum of 49 are taken outside the department.

Curriculum
Students are expected to take an average course load of 16 credits per semester during their four years. They must complete an introductory course in each of the areas of painting, sculpture, printmaking, and photography and four in drawing by the end of the second year. If the printmaking introductory sequence is chosen, the student must take two introductory courses from among the three areas of printmaking. All studio courses may be repeated only for elective credit. No student may take less than one studio course in a semester unless there are exceptional circumstances expressed in the form of a petition. The department discourages accelerated graduation. However, a student may petition for consideration of early graduation by submission of a petition to the faculty before course enrollment in the spring semester of the student's junior year.

Any request to deviate from the standard curriculum must be petitioned prior to the act.

Concentration
Students must plan their programs to complete 27 credits in one of the studio areas of painting, sculpture, or photography. In the area of printmaking, students must complete 26 credits. All B.F.A. students must complete a senior thesis in one area of concentration and are required to participate in the Senior Exhibition.

Concentration Requirements (27 credits total, 26 in printmaking)

The required courses for each concentration are as follows:

Painting: ART 121, 221, 321, 322, 421, 422 (Thesis)
Sculpture: ART 141, 241, 341, 342, 441, 442 (Thesis)
Photography: ART 161, 261, 263/264, 361 and 361 (2 of 4)

Dual Concentration
If a student is interested in studying in more than one area, he or she may choose to do a dual concentration. The dual concentration requires a first area, in which the thesis is conducted, and a non-thesis second area. Pre-thesis must be taken in the first area of concentration. In the first area of concentration, students must take 23 credits in one of the areas of painting, photography, or sculpture, or 22 credits in printmaking. In the second area, students must take 15 credits in drawing, painting, photography, or sculpture or 14 credits in printmaking.

The required courses for the dual concentration are:

First Area of Concentration

Total Credits
Painting: ART 121, 221, 321, 421, 422 23
Sculpture: ART 141, 241, 341, 441, 442 23
Photography: ART 161, 261, 263/264, 361/361/476 (1 of 4), 461, 462 23

Second Area of Concentration

Total Credits
Drawing: ART 151, 152, 251, 252, repeat 251 15
Painting: ART 121, 221, 321, 322 15
Sculpture: ART 141, 241, 341, 342 15
Photography: ART 161, 261, 263/264, 361/361/476 (2 of 3) 15

Note: The total number of out-of-college elective credits required will be adjusted to allow for the additional credits required of the dual concentration.

Multimedia Concentration
The multimedia program enables students to fulfill concentration requirements by combining several studio disciplines, including out-of-department studio courses such as those offered in the departments of music, theatre, and dance, etc. In order to engage in the multimedia concentration, students must have a 3.0 grade average and must apply by petition. The number of students accepted will be limited.

The required courses for the concentration in Multimedia (33 credits) are:

100 and 200 level studios
ART 1__ _2__ 8
200 and 300 level studios
ART 2__ _2__ _3__ __3__ (2 of 4) 8
Pre-Thesis and Thesis
ART 481, 482 12
Out-of-college studio electives
(minimum of 2) 6
OCE Studio, OCE Studio 12

Total 33 credits

Note: The total number of in/out-of-college elective credits required will be adjusted to allow for the additional credits required of the multimedia concentration.

Out-of-College Requirements
A minimum of 49 electives credits must be taken outside of the college. In the first year, students must take two freshman writing seminars. Students are required to take courses from among three groups, which include: Physical and Biological Sciences (minimum of two courses, of at least 3 credits each); Social Sciences and History (minimum of three courses, of at least 3 credits each); and, Humanities and Expressive Arts (minimum of two courses, of at least 3 credits...
each). All BFA students are required to take 12 credits in the History of Art. One course must be taken in each of the following areas:

Elective: Any art history elective at the 300 level or above or any architectural history elective.

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. No student may study in absentia for more than two terms.

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.

Rome Program
Students in good standing who have completed the requirements of the first two years of the curriculum are eligible for participation in the Rome Program. Students are admitted to the program by application and review of their record. Students in the department wishing to attend the Rome Program must register for a full semester of study.

Students who transfer into the Rome Program must register for a full semester of study. Students wishing to spend two consecutive semesters in Rome are encouraged to do so. In both cases students must petition for special consideration. This petition must include the proposed course schedule for both semesters and must show signatures of approval by the adviser in the student's area of concentration, the department chair, and by the Rome Program Adviser.

Rome Curriculum
Art 400 Rome Studio 4
Fulfills 4 credits of concentration
Art 317 History of Art 4
Art 372 Modern Art in Italy 3
Italian 111/112 Italian Language 4
Arch 317 Contemporary Italian Film 1

16 Total

Students may not take more than 16 credits a semester in the Rome Program. Students may study in Rome for one or two academic semesters.

*Fulfills Art 311, Issues in Contemporary Art.

For those students matriculating in fall of 1995:
Students are required to take ART 100, Basic Studio in Art; ART 111, Introductory Art Seminar; ART 171, Electronic Imaging in Art; ART 112, History of World Art; and a Freshman Writing Seminar during the fall semester of the freshman year. ART 113, History of World Art, and an additional Freshman Writing Seminar must be taken during the spring semester of the freshman year. ART 311, Issues in Contemporary Art, must be taken sometime during the junior or senior year.

First Year

<table>
<thead>
<tr>
<th>Fall Term (Required Curriculum)</th>
<th>Credits</th>
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<tbody>
<tr>
<td>100 Basic Studio in Art</td>
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<tr>
<td>111 Introductory Art Seminar</td>
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<tr>
<td>151 Drawing I</td>
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<td>171 Electronic Imaging in Art</td>
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<tr>
<td>112 History of World Art</td>
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<td>Freshman Writing Seminar</td>
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<tr>
<th>Spring Term (Required Curriculum)</th>
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<tbody>
<tr>
<td>121 Introductory Painting</td>
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<tr>
<td>141 Introductory Sculpture</td>
<td>3</td>
</tr>
<tr>
<td>152 Drawing II</td>
<td>3</td>
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<tr>
<td>113 History of World Art</td>
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<tr>
<td>Freshman Writing Seminar</td>
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Second Year

<table>
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<th>Credits</th>
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<tr>
<td>131 Introductory Etching</td>
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<td>132 Introductory Graphics</td>
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<td>133 Introductory Lithography</td>
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<tr>
<td>161 Introductory Photography</td>
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<tr>
<td>251 Drawing III</td>
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<tr>
<td>Out-College Elective (OCE)/Art History</td>
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<td>OCE</td>
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<tr>
<th>Spring Term</th>
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<tbody>
<tr>
<td>200 Level Studio</td>
<td>3</td>
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<tr>
<td>252 Drawing IV</td>
<td>3</td>
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<tr>
<td>OCE/Art History</td>
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Third Year

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<td>200 Level Studio</td>
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<tr>
<td>Art Studio concentration</td>
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<tr>
<td>311 Issues in Contemporary Art</td>
<td>3</td>
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<tr>
<td>OCE</td>
<td>3</td>
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<tr>
<td>In/OCE</td>
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<td>Art Studio concentration</td>
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<tr>
<td>OCE/Art History</td>
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<tr>
<td>252 Drawing IV</td>
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<tr>
<td>In/OCE</td>
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For those students who matriculated fall 1994:
Students are required to take ART 111, Introductory Art Seminar, and a Freshman Writing Seminar, during the fall semester of the freshman year. ART 110, Color, Form, and Space, must be taken during the spring semester of the freshman year. ART 311, Issues in Contemporary Art, must be taken sometime during the junior or senior year.

First Year

<table>
<thead>
<tr>
<th>Fall Term</th>
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<tbody>
<tr>
<td>111 Introductory Art Seminar</td>
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<tr>
<td>121 Introductory Painting</td>
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<tr>
<td>141 Introductory Sculpture</td>
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<tr>
<td>151 Drawing I</td>
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<tr>
<td>Out-of-College Elective (OCE)/Art History</td>
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<tr>
<td>OCE/Freshman Writing Seminar</td>
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<td>110 Color, Form, and Space</td>
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<td>131 Introductory Etching</td>
<td>3</td>
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<tr>
<td>132 Introductory Graphics</td>
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<td>133 Introductory Lithography</td>
<td>3</td>
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<tr>
<td>152 Drawing II</td>
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<td>161 Introductory Photography</td>
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Second Year

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<th>Fall Term</th>
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<tr>
<td>Art Studio concentration</td>
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<tr>
<td>311 Issues in Contemporary Art</td>
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<td>OCE</td>
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<tr>
<td>Art Studio concentration</td>
<td>4</td>
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<tr>
<td>OCE/Art History</td>
<td>3</td>
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<tr>
<td>252 Drawing IV</td>
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<tr>
<td>In/OCE</td>
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Third Year

**Fall Term**

Art Studio concentration 4
311 Issues in Contemporary Art 3
OCE/Art History 3-4
In/OCE's 6

16-17

**Spring Term**

Art Studio concentration 4
OCE/Art or Architectural History 3-4
In/OCE's 9

16-17

Fourth Year

**Fall Term**

Pre-Thesis 6
In/OCE's 11

17

**Spring Term**

Thesis 6
In/OCE's 10-11

16-17

Students who matriculated before fall 1994, should refer to the Courses of Study and College Handbook for their entering year.

**Graduate Program**

The Master of Fine Arts program requires four terms of residence and sixty credits; it is intended for those who want to further their education as artists. Candidates must complete eighteen credits of course work in the history of art, either as a graduate or undergraduate student and must earn at least twelve credits for academic work outside the Department of Art.

Every M.F.A. candidate must (1) prepare a written thesis, (2) offer a thesis exhibition of studio work completed during residency, and (3) give an oral defense of the written thesis and exhibition. The written thesis may deal with the major concerns of the student's own work or with the aesthetic or historical issue in art. The oral defense of the written thesis is presented at the time of the thesis exhibition.

The art programs are housed in buildings that are open twenty-four hours a day (for students enrolled in our courses) and are near the Fine Arts Library (about 150,000 volumes) and the university's Herbert F. Johnson Museum of Art.

Graduate students in the painting program work in private studios housed in Olive Tjaden Hall.

The sculpture program has its own building, a 45-by-180 foot converted foundry with 14-foot ceilings and a bronze casting facility. Separate studios, complete gas- and arc-welding facilities, heavy-duty grinders, a drill press, a band saw, and a variety of portable power tools are provided.

In the printmaking program, students study in the various techniques, including relief, intaglio, lithography, serigraphy, and various photographic processes. Experimentation and tradition, theory, history, and practice are part of the program. Printmaking program facilities are in Olive Tjaden Hall and include etching presses, lithographic presses, and proof presses.

The photography program involves the study of various photographic processes such as black and white, color, nonsilver, and large-format, with emphasis on both aesthetics and technique. Photography facilities are located in Sibley Hall.

**Course Information**

Most courses in the Department of Art are open to students in any college of the university who have fulfilled the prerequisites or have permission of the instructor.

Fees are charged for all studio courses. See the specific course description for course fees.

To take advantage of the special opportunities afforded by summer study, the department has developed several summer-only courses.

**Courses in Theory and Criticism**

ART 110 Color, Form, and Space
Spring. 3 credits. Fall enrollment limited to B.F.A. candidates. Not offered 1995-96. A study of the principles of color, form, and space. Artistic expression and techniques will be discussed emphasizing post-war painting and sculpture. Visits with artists in studios, galleries and museums will introduce students to the exchange between artists, dealers and critics. Fulfills Art 311, Issues in Contemporary Art, requirements for Fine Arts majors.

ART 111 Introductory Art Seminar
Fall. 1 credit. S-U only. Limited to B.F.A. students. Students meet each week with a different member of the faculty. The varying artistic interests of the faculty are presented and discussed.

ART 112 History of World Art
Fall. 3 credits. This two-semester course will survey world art from the Paleolithic era to the present. While primary emphasis will be placed upon the art and architecture of the western tradition, lectures on the visual arts outside that tradition will also be presented. The course will emphasize major monuments, important trends and developments, and critical approaches to the art of the past and present. The history of artistic styles will be studied in relation to cultural factors shaping the work of artists such as patronage, politics, religion, and economics. The original settings and functions of works of art and buildings will be emphasized as will the possibilities and limitations of materials and techniques.

ART 113 History of World Art
Fall and spring. 3 credits. Continuation of Art 112.

ART 311 Issues in Contemporary Art
Fall. 3 credits. A seminar course in issues of contemporary art, including lectures by visiting artists.

ART 317 Art in Rome: Early Christian to the Baroque Age
Fall. 4 credits. General survey of the early Christian period to the fantastic vision of Piranesi in the eighteenth century. Special emphasis will be placed on the developments of the Renaissance and Baroque periods. Weekly lecture and field trips.

ART 318 Art In Rome: Renaissance in Rome and Florence
Spring. 4 credits. A direct knowledge of art in its historical context is the aim of this course. Open both to students interested in history and to those concentrating on the visual impact of art. Included are lectures and field trips.

ART 372 Special Topics in Art Studio/Rome: Modern Art in Italy
Fall or spring. 3 credits. This course is designed to introduce the art/art history student to contemporary developments in Italian art and to major issues concerning the art world. Significant movements of the twentieth century, including Futurism, Metaphysical painting, and Magic Realism will be discussed emphasizing post-war painting and sculpture. Visits with artists in studios, galleries and museums will introduce students to the exchange between artists, dealers and critics. Fulfills Art 311, Issues in Contemporary Art, requirements for Fine Arts majors.

ART 610 Seminar in Art Criticism
Fall or spring. 2 credits; may be repeated for credit. Four terms required for M.F.A. candidates. Historical and modern critical opinions and their relation to problems in the theory of art are studied.

**Studio Courses In Painting**

Fees for painting courses:

121, 221, 321, 322, 32S, 421, 422: $40

ART 121 Introductory Painting
Fall, spring, or summer. 3 credits. An introduction to the problems of artistic expression through the study of pictorial composition, proportion, space, shapes, and color as applied to abstract and representational design.

ART 123 Landscape Painting
Summer. 3 credits. Class meets outdoors at selected sites in the Ithaca area. A different motif is explored each week. Pen, pencil, and water- or oil-based colors (optional) are the materials employed. Analysis and discussion of the landscape work of Corot, Cézanne, van Gogh, Seurat, and others are included.

ART 124 Painting and Drawing
Summer. Variable credit (maximum 5). A special summer abroad course with emphasis on artistic expression and techniques, for students at all levels of skill. Included will be a mixture of painting and drawing assignments, self-initiated projects, and drawing sessions with a live model.

ART 221 Painting II
Fall or spring. 4 credits. Prerequisite: Art 121 or permission of instructor. A continuation of Art 121.

ART 321 Painting III
Fall. 4 credits. Prerequisite: Art 221 or permission of instructor. Continued study of the principles of painting and the selection and expressive use of materials and media. Group discussions and individual criticism.
ART 322 Printing IV
Spring. 4 credits. Prerequisite: Art 321 or permission of instructor.
Continued study of the principles of printing and the selection and expressive use of materials and media. Group discussions and individual criticism.

ART 233 Lithography II
Fall or spring. 4 credits. Prerequisite: Art 232 or permission of instructor.
Continued study of the principles of lithography and the selection and expressive use of materials and media. Group discussions and individual criticisms.

ART 241 Sculpture II
Fall or spring. 4 credits. Prerequisites: Art 141 or permission of instructor.
Various materials, including clay, plaster, wood, stone, and metal, are used for exercises involving figurative modeling, abstract carving, and other aspects of three-dimensional form and design. Beginning in the second year, students are encouraged to explore the bronze casting process. The sculpture program, which is housed in its own building, contains a fully equipped bronze casting foundry.

ART 411 Introductory Sculpture: Metal
Fall or spring. 3 credits. Prerequisite: Art 141 or permission of instructor.
Continued study of the principles of sculpture and the selection and expressive use of materials and media. Group discussions and individual criticism.

ART 331 Printmaking III
Fall or spring. 4 credits. Prerequisite: Art 331 or permission of instructor.
Continuation of the study and practice of lithographic printing, with emphasis on color.

ART 332 Printmaking IV
Fall. 4 credits. Prerequisite: Art 331 or permission of instructor.
Continuation and expansion of Art 331.

ART 431 Pre-Thesis in Printmaking
Spring. 6 credits. Prerequisite: Art 332 or permission of instructor.
Further study of the art of graphics through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism.

ART 432 Thesis in Printmaking
Fall or spring. 6 credits. Prerequisite: Art 331 or 332 or permission of instructor.
Advanced printmaking project to demonstrate creative ability and technical proficiency.

ART 731-732, 831-832 Graduate Painting
731 and 831, fall; 732 and 832, spring. Credit as assigned. May be repeated for credit. Limited to M.F.A. students in painting.

ART 141.1 Introductory Sculpture
Fall, spring, or summer. 3 credits. Open enrollment. Slide lectures will provide a historical overview. Open enrollment.

ART 141.3 Introductory Sculpture: Metal Fabrication and Bronze Casting
Summer. 3 credits. This course will introduce students to materials, techniques, and processes associated with metal fabrication and bronze casting. Through a series of assignments, students will explore the unique character of metals.

ART 241 Sculpture II
Fall or spring. 4 credits. Prerequisites: Art 141 or permission of instructor.
Various materials, including clay, plaster, wood, stone, and metal, are used for exercises involving figurative modeling, abstract carving, and other aspects of three-dimensional form and design. Beginning in the second year, students are encouraged to explore the bronze casting process. The sculpture program, which is housed in its own building, contains a fully equipped bronze casting foundry.

ART 411 Introductory Sculpture: Metal
Fall or spring. 3 credits. Prerequisite: Art 141 or permission of instructor.
Continued study of the principles of sculpture and the selection and expressive use of materials and media. Group discussions and individual criticism.

ART 342 Sculpture IV
Spring. 4 credits. Prerequisite: Art 241 or permission of instructor.
Continuation and expansion of Art 341.

ART 343 Sculpture V
Fall, spring, or summer. 4 credits. Prerequisite: Art 342 or permission of instructor.
Continued study of the principles of sculpture and the selection and expressive use of materials and media. Group discussions and individual criticism.

ART 441 Pre-Thesis in Sculpture
Fall. 6 credits. Prerequisite: Art 341, 342 or permission of instructor.
Further study of the art of sculpture through both assigned and independent projects executed in various media. Instruction through group discussions and individual criticism.

ART 442 Thesis in Sculpture
Fall or spring. 6 credits. Prerequisite: Art 341 or 342 or permission of instructor.
Advanced sculpture project to demonstrate creative ability and technical proficiency.

ART 741-742, 841-842 Graduate Sculpture
741 and 841, fall; 742 and 842, spring. Credit as assigned. May be repeated for credit. Limited to M.F.A. students in sculpture.

ART 231 Intaglio Printing II
Fall or spring. 4 credits. Prerequisite: Art 131 or permission of instructor.
Continuation of the study and practice of methods of intaglio printing, with emphasis on techniques and color.
ART 161 Photography I (also Architecture 251)
Fall, spring, or summer. 3 credits.
A basic lecture-studio course in black and white photography for beginners. Emphasis is on basic camera skills, darkroom techniques, and understanding of photographic imagery.

ART 166 Introduction to Photography for Non-Majors
Not offered 1995-96.

ART 167 Photography
Summer. Variable credit (maximum 5).
A special summer-abroad course with emphasis on both the techniques and aesthetics of black-and-white photography, for students at all levels of skill. Initial photographic assignments will be followed by other projects of the student's own choosing.

ART 168 Black-and-White Photography
Summer. 3 credits.
Intended for students at all levels, from introductory to advanced. Emphasis on camera skills, darkroom techniques, and the content of black-and-white photographic imagery.

ART 169 Color Photography
Summer. 3 credits.
Intended for students at all levels, from introductory to advanced. Emphasis on camera skills, darkroom techniques, and the content of color photographic imagery.

ART 261 Photography II (also Architecture 351)
Fall, spring, or summer. 4 credits.
Prerequisite: Art 161 or Architecture 251, or permission of instructor.
A continuation of Photography I concentrating on black and white photographic processes, history and theory of creative practice, and individual projects.

ART 263 Color Photography
Fall, spring, or summer. 4 credits.
Prerequisite: Art 161 or permission of instructor.
A studio course in color photography with emphasis on camera skills, darkroom techniques, and the content of color photographic imagery.

ART 264 Photo Processes
Fall or spring. 4 credits.
Prerequisite: Art 161 or permission of instructor.
A studio course in alternate and nonsilver photographic processes. Emphasis is on camera skill, basic techniques and processes, image content, and creative use of photo processes.

ART 265 Studio Photography
Fall or spring. 4 credits.
Prerequisite: Art 161 or permission of instructor.
A course in the use of medium- and large-format cameras that explores technique, lighting, and the use of larger-format cameras for personal expression both in the studio and outdoors.

ART 361 Photography III
Fall, spring, or summer. 4 credits.
Prerequisite: Art 161, 261, or permission of instructor. Not offered 1995-96.
Continued study of creative use of photography, with emphasis on specialized individual projects.

ART 362 Photography IV
Fall, spring, or summer. 4 credits.
Prerequisite: Art 161, 261 or permission of instructor. Not offered 1995-96.
Continued study of creative use of photography, with emphasis on specialized individual projects.

ART 461 Pre-Thesis in Photography
Fall. 6 credits.
Prerequisite: Art 361 or permission of instructor.
A studio course intended for photography majors and other qualified students.

ART 462 Thesis in Photography
Fall or spring. 6 credits.
Prerequisite: Art 461 or permission of instructor.
A studio course intended for photography majors and other qualified students. Advanced photography project to demonstrate creative ability and technical proficiency.

ART 751-752, 851-852 Graduate Photography
751 and 851, fall; 752 and 852, spring. Credit as assigned. May be repeated for credit. Limited to M.F.A. students in photography. Prerequisite: permission of instructor.
Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they will work. Members of the faculty are available for consultation. Discussion sessions of work in progress are held.

Studio Courses in Drawing

ART 151 Drawing I
Fall, spring, or summer. 3 credits.
A course that is general in nature and introduces students to principles and techniques of representation. Emphasis will be on creating the illusion of space and form through line, the rendering of light and shade, and studies in perspective. In addition, the student will have the opportunity to explore various media such as charcoal, chalk, pencil, pen, ink and wash, etc.

ART 152 (251) Drawing II
Fall or spring. 3 credits.
Prerequisite: Art 151.
A general course in drawing that will emphasize figure study and life drawing. This course will build on the foundation of Art 151 concentrating on the analytical study of the figure. Students will explore a variety of materials, traditional and contemporary.

ART 158 Conceptual Drawing
Summer. 3 credits.
Emphasis on drawing from the imagination. The generation of ideas and their development in sketches is stressed. The intent is not to produce finished art but rather to experience a series of problems that require image and design concepts different from those of the artist working directly from nature.

ART 159 Life and Still-Life Drawing
Summer. 3 credits.
The human figure and still life are studied both as isolated phenomena and in relation to their environment. Focuses on helping the student observe and discover.

ART 251 (351) Drawing III
Fall or spring. 3 credits.
Prerequisites: Art 152.
An intermediate drawing course in which students will study composition, the articulation of form, and the illusion of space in a variety of materials. Expressive content, conceptualization, and the exploration of materials will be stressed.

ART 252 Drawing IV
Fall or spring. 3 credits.
Prerequisites: Art 251.
Advanced drawing with an emphasis on life drawing and figure composition. Individual expression will be encouraged along with creative investigation of materials and processes.

ART 352 Anatomy for Artists
Spring. 3 credits.
Prerequisites: Art 151, 159, and 251 or permission of instructor.
Not offered 1995-96.
Develops basic understanding of the structure of the human figure as it is relevant to artists through an in-depth study of the skeleton and muscle-tendon systems. Focuses on improving understanding and skill in design and observation, as well as gaining an understanding of how the materials may be relevant to making art through the study of works by the masters.

Graduate Thesis

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

Special Studio Courses
Course fees:

100 $25
171, 172 $100

ART 100 Basic Studio in Art
Fall. 4 credits.
An introductory course designed to teach basic art concepts and theory, to introduce all art media, and provide a basis for the study and practice of the visual arts.

ART 171 Electronic Imaging in Art (formerly Computer Art I)
Fall, spring, or summer. 4 credits.
An introductory studio course that emphasizes the use of the computer as a tool for making art. Introduction to Apple Macintosh microcomputers and image scanning, and an exploration of various 2-D graphic image manipulation programs such as Adobe Photoshop. Additionally, an introduction to programs for 3-D modeling and rendering, and 3-D animation and editing.

ART 172 Computer Art II
Fall, spring, or summer. Prerequisite: Art 171 or permission of instructor.
Not offered 1995-96.
A studio course in the use of the computer as a tool for making art. An introduction to graphics programs in the creation of multimedia projects on Apple Macintosh systems.
Emphasis is on combining graphics, scanned 2-D imagery, with 3-D animation and sound, with output to video.

**ART 372 Special Topics in Art Studio**
Fall, spring, or summer. Variable credit. An exploration of a particular theme or project.

**ART 372.1 Special Topics: Art and the Multicultural Experience**
Fall. 3 credits. This course is intended to introduce students to a variety of ways of seeing, understanding, and appreciating art. A general survey and exploration of selected art works from ancient to contemporary and produced in Europe, the United States, Africa, and other non-western cultures will be made to provide a context for appreciating the aesthetic contributions of diverse ethnic cultures. The course will emphasize understanding the visual concepts, processes, techniques, and styles used by different cultures.

**ART 372.2 Special Topics: Digital Photography**
Fall. 4 credits. An advanced studio course in digital photography. Emphasis on individual projects exploring developing technologies in photography.

**ART 379 Independent Studio**
Summer. Credit by arrangement. Students who have the interest and ability to progress beyond the problems of their particular course may register for additional credits. Students plan courses of study or projects that must meet the approval of the instructor. They have selected to guide their progress and criticize the results. A course fee may be charged.

**ART 400 Rome Studio**
Fall or spring. 4 credits. Prerequisite: permission of instructor. Fee: $25. The content for the Rome studio will be determined by the instructor. Emphasis will be divided between work accomplished in the studio and work executed outdoors in the environs of Rome. Media will consist primarily of painting, drawing, sculpture, and photography, or those assigned by the instructor.

**ART 471-476 Independent Studio**
Fall, spring, or summer. Variable credit (maximum, 4). Students may register for two studios in a semester. May be repeated for credit. Prerequisite: written permission of instructor.

**ART 481 Pre-Thesis in Multi Media**
Fall or spring. 6 credits. Prerequisite: permission of instructor. Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they will work. Projects should reflect experiences gained by exploring and combining various media including those taken in studio courses outside the department.

**ART 482 Thesis in Multi Media**
Fall or spring. 6 credits. Prerequisite: 481 or permission of instructor. Students are responsible, under faculty direction, for planning their own projects and selecting the media in which they will work. The projects should reflect experiences gained by exploring and combining various media including those taken in studio courses outside the department.

**CITY AND REGIONAL PLANNING**

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

**The Undergraduate Program in Urban and Regional Studies**
The Program in Urban and Regional Studies (URS) is a four-year academic program aimed at assessing the problems of human communities and regions. Students graduating from the program receive a Bachelor of Science degree. The program is intended to provide both an excellent liberal arts education and a strong concentration of studies respecting urban and regional issues. The urban and regional studies courses in the program are designed to provide students a broad understanding of relevant issues, ability to assess those issues, and technical analysis skills. The URS Program is truly interdisciplinary, requiring students to confront urban and regional problems from a variety of perspectives and through the analytic tools of different disciplines.

**Basic Degree Requirements**

*Requirements for Graduation*

URS requirements include (1) eight semesters of residence, (2) 120 credits, (3) two freshman seminars, (4) qualification in one foreign language, (5) four groups of distribution requirements, (6) required courses for major, (7) area requirements for major, (8) free electives, (9) a minimum of 34 courses. The university requires students to complete two semesters of physical education.

1) General education
   a. Freshman writing seminars: 2 courses
   b. Foreign language: 3 courses or qualification in one foreign language
   c. Distribution Requirements: 9 courses

Students must take a total of nine courses for the distribution requirement: four courses (of three or more credits each) from Groups 1 and 2, at least two of which are from Group 1, and at least one of which is from Group 2; five courses from Groups 3 and 4, with at least two in each group and two in the same department. No single course may satisfy more than one distribution requirement. URS students must utilize the College of Arts and Sciences designation of specific courses that may be taken to meet the requirements for groups 1-4.

Group 1: Physical and biological sciences (2-3 courses required)
Group 2: Quantitative and formal reasoning (1-2 courses required)
Group 3: Social sciences and history (2-3 courses required)
Group 4: Humanities and the arts (2-3 courses required)

**Advanced Placement Credit**

Students may apply up to two courses of approved advanced placement credit in calculus, computer science, and science toward satisfaction of the distribution requirement in Groups 1 and 2 above, provided that they complete at least one science course during their undergraduate career. They may apply no advanced placement credit toward satisfaction of the distribution requirement in Groups 3 and 4.

Grades of S-U courses applied to distribution requirements are not acceptable.

2. Required Courses for Major: 5 courses
   a. Freshman writing seminars: 2 courses
   b. Freshman writing seminars: 2 courses
   c. Distribution Requirements: 9 courses

**Micro Economics Courses**

C&E 101: Introductory Micro Economics
C&E 110: Intermediate Micro Economics
ECON 101: Introduction to Micro Economics
ECON 203: Micro Economics
ECON 313: Intermediate Micro Economics

**Architecture Courses**

ARCH 131: An Introduction to Architecture I
ARCH 132: An Introduction to Architecture II
ARCH 181: History of Architecture I
ARCH 182: History of Architecture II

3. Area Requirements for Major: 11 courses
   a. Design
   b. Foreign language: 3 courses or qualification in one foreign language
   c. Distribution Requirements: 9 courses

Students must take one listed CRP course in each of the following 6 areas: Design, Economics, Environment, History, Politics/Policy, Quantitative Analysis

Architectural courses:

**References**

CRP 415: Gender Issues in Planning and Architecture
CRP 481: Principles of Spatial Design and Aesthetics
CRP 482: Urban Land Use Concepts
The Graduate Program in City and Regional Planning
The major concentrations of course work in city and regional planning are in the following areas.

Off-Campus Opportunities
Cornell-in-Washington Program. Students in good standing may be eligible to earn degree credits in the Cornell-in-Washington program through course work and an urban-oriented externship in Washington, D.C. Students may work as externs with governmental, congressional offices, executive-branch agencies, interest groups, research institutions, and other organizations involved in the political process and public policy. Students also select one or two other seminars from such fields as government, history, economics, human development, architectural history, natural resources, and social policy. All seminars are taught by Cornell faculty members and carry appropriate credit toward fulfillment of major, distribution, and other academic requirements.

Cornell Abroad. Cornell encourages qualified undergraduates to study abroad in the belief that exposure to foreign cultures is an important component of a good education. In an increasingly interdependent world, the experience of living and learning in a foreign country is invaluable. With this in mind, the university is continuing to develop study abroad opportunities. Current programs are available in Great Britain, Spain, and Germany. Opportunities in Asia, the Middle East, and France should be forthcoming. The department encourages its students to explore these opportunities.

Cornell-in-Rome Program. The College of Architecture, Art, and Planning has a teaching facility in Rome located in the sixteenth-century Palazzo Massimo. Students in good standing are eligible to earn degree credits through course work undertaken with Cornell faculty assigned to Rome and with accredited instructors. Courses are available in areas of urban development, regional development, and architecture and art.

Research and fieldwork. Students are welcome to work with department faculty members on research or other opportunities that are appropriate to their particular interests. Fieldwork and community-service options also exist for students in the Urban and Regional Studies Program.

Additional Degree Options
Linked degree options. Urban and regional studies students have the opportunity to earn both a Bachelor of Science degree and a Master of Regional Planning (M.R.P.) degree in a five-year program. Ordinarily the professional M.R.P. degree requires two years of work beyond that for the bachelor's degree. This arrangement shortens that time by about one year. A minimum of 30 credits and a master's thesis or thesis project are required for the M.R.P. degree. Students apply to the Graduate School, usually in the senior year.

Dual degree option. A student in the Cornell College of Arts and Sciences currently can earn both a B.A. in an arts college major, plus a B.S. in urban and regional studies in a total of five years. Special requirements have been established for this dual degree program. Cornell students interested in pursuing the dual degree program should contact either the director of the Urban and Regional Studies Program or the appropriate dean of the College of Arts and Sciences for further information.
Regional planning and regional science are concerned with socioeconomic issues and functional planning at the regional level, the forces that generate economic growth and social development, and the ways in which resources can be best used.

Local and regional economic development is concerned with understanding and influencing how economic change may be harnessed to the benefit of communities, countering plant closings and more general regional decline and stimulating more equitable programs of socioeconomic change and development.

International planning offers a broad range of courses in international economic development, development planning, and political economy. Quantitative methods and policy analysis courses are offered to prepare planners and researchers for a variety of situations and problems.

Complementing these concentrations, planning theory and political economy courses examine the organizational and planning processes and the political and economic conditions in which planning and international development operate.

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

Off-Campus Opportunities

Rome Program. Graduate students have the opportunity to spend one or two semesters in Rome, studying at Cornell’s center at the Palazzo Massimo. Instruction is given by Cornell professors-in-residence and by other faculty. The program is structured to include work assignments in one of the international development organizations headquartered in Rome.

Course Information

Most courses in the Department of City and Regional Planning are open to students in any college of the university who have fulfilled the prerequisites and have the permission of the instructor.

The department attempts to offer courses according to the information that follows. However, students should check with the department at the beginning of each semester for late changes.

Undergraduate Program in Urban and Regional Studies

CRP 101 The Global City: People, Production, and Planning in the Third World

Spring. 3 credits.

A critical look at the physical and social development of giant cities in the Third World. Their origins, roles, contributions, and shortcomings are examined. Their place in world political economy is evaluated. Policy prescriptions for their principal problems are discussed.

CRP 261 Urban Archaeology

For description, see LA 261.

CRP 271 Introduction to African Development (also ASRC 271)

Fall or spring. 3 credits.

A survey of development problems in Sub-Saharan Africa, including the importance of the natural resource base, the policy and institutional factors affecting development, and the human resource potential in the continent.

CRP 314 Planning, Power, and Decision Making

Fall. 3 credits.

This seminar examines various bases of political and professional power. We ask, What do professionals who want to serve the public need to know about power and decision-making processes in the institutional settings in which they operate? How and why can professionals make a difference when facing problems characterized by great complexity and severe inequalities among affected groups?

CRP 315 The Progressive City

Spring. 3 credits.

A review of attempts to incorporate the interest of working-class and poor constituencies through majority control of local governments. Topics to be covered include the role of the city in class formation; historical perspectives on urban political administration; contemporary populist, socialist, and progressive urban governments; and the search for an economic basis for progressive reforms.

CRP 321 Introduction to Statistical Reasoning for Urban and Regional Analysis

Fall. 4 credits.

An introductory review of theories dealing with such topics as population, economic activity, drawn from various social science disciplines such as geography, economics, and sociology. Review of recent research dealing with such topics as population distribution, migration, location of industry and economic activity, and the spatial organization of urban and regional social systems.

CRP 361 Seminar in American Urban History (also CRP 662)

Spring. 3 credits. Prerequisite: permission of instructor.

Seminar in the historical evolution of the American city. Emphasis on factors in urban growth, the process of urbanization, the urban reform movement, and intellectual and social responses to the city.

CRP 363 American Indians, Planners, and Public Policy (also CRP 547)

For description, see LA 363.

CRP 380 Environmental Politics

Spring. 4 credits.

Examines the politics of public decisions affecting the environment. Focuses on the roles played by different political actors, the powers of various interest groups, methods for influencing environmental decisions, and the political and social impacts of those decisions.

CRP 582 Urban Housing: Sheltered vs. Unsheltered Society (also CRP 582)

Fall or spring. 4 credits.

Homelessness is the latest in a continuing list of terms to describe unmet housing needs. To understand how and why such needs persist, even in good economic times, one must examine the nature of interactions between housing policies and housing market forces. This course examines the complex interaction of public and private actions in the development and redevelopment of urban housing. More specifically, the course seeks to investigate the many ways in which private and public policy decisions determine which groups in society will have access to housing. This course is appropriate for students with an interest in urban housing and a background in any of the following areas: urban economics, urban sociology, anthropology, history, or geography. The course will consist of lectures, a wide variety of readings, and guest speakers. Students will be evaluated on the basis of class discussions, two exams, a 15-20 page paper, and an oral presentation.

CRP 400 Introduction to Urban and Regional Theory

Fall. 4 credits. Open to juniors and seniors.

Introductory review of theories dealing with the spatial distribution of population and economic activity, drawn from various social science disciplines such as geography, economics, and sociology. Review of recent research dealing with such topics as population distribution, migration, location of industry and economic activity, and the spatial organization of urban and regional social systems.

CRP 401 Seminar in Urban Political Economy

Spring. 4 credits. Prerequisites: introductory economics or sociology; for URS students, CRP 400 also.

The world economy, the global city, and social change. Population, technology, and work in industrial and developing countries. Race, ethnicity, and nationality. Profits, subsistence, and poverty. Students may read and discuss papers on outstanding texts, write book reviews, and prepare brief reports.
An introduction to how the legal system makes decisions that have been handed down under mental Policy Act, the Clean Air Act, and the federal statutes such as the National Environ­forms of social welfare provisions and how they are administered. A basic introduction to new issues arising from the way in which national and international economic shifts are affecting diverse United States localities. The course will focus on intra-industry restructuring, the location of economic activities, and state and local economic policies. Case studies will be drawn from a variety of industries and national situations, with specific application to New York and other Northeast locations. Students learn to use microcomputers and software packages in the planning and problem-solving processes. Included are word processing, spreadsheets, mapping, and other types of packages that are useful for other classes and for professional work in the field. (WordPerfect, Lotus 1-2-3, dBase and MacGIS are examples of packages that have been taught in previous years.) For description, See S&TS 442. This course addresses conceptual issues underlying social policy and the provision of social welfare and analyzes how different positions are reflected in a set of current social welfare controversies. The first part of the course will introduce principles that guide the development of social policy including fairness and justice. Various conceptions of society will be examined with reference to their influence on the extent and nature of social welfare provision, comparing the U.S. and other industrialized countries. The second part of the course will examine the relationship between economic change and social policy in the United States. A series of current social policy controversies (such as AIDS, homelessness, abortion, and workplace) will illustrate how values and assumptions about state, economy, and society affect the forms of social welfare provisions and how they are administered. An introduction to how the legal system handles environmental problems. Study of federal statutes such as the National Environmental Policy Act, the Clean Air Act, and the Clean Water Act, and of important judicial decisions that have been handed down under federal environmental statues and regulations. Discussion of environmental law topics from a policy management perspective. This course is designed for undergraduate and graduate students interested in urban issues, planning, natural resource, government, environmental engineering, law, business, architecture, landscape architecture, etc. Course assignments for graduate students will differ in some aspects from those for undergraduates. Community Service Fieldwork Fall or spring. 4 credits variable. Permission is granted by instructor. Undergraduate students work under the direction of a faculty member in the CRP department on a project that assists a public or nonprofit organization. Projects will involve urban and regional issues as defined by a “client” and agreed upon by the faculty member. Principles of Spatial Design and Aesthetics (also CRP 581 and Landscape Architecture 480) Fall. 3 credits. Course enrollment is restricted to planning and landscape architecture students unless special permission is granted by instructor. A lecture course that introduces the spatial and visual design vocabularies of cities. Aesthetic principles and theories of design are investigated for different types of urban spaces drawn from a variety of international examples, historic and modern. Included in the course are design methods and applications in the contemporary urban context of Europe and North America. Urban Land Use Concepts Fall. 3 credits. Explorations of the use of land in urban areas, with an emphasis on the experience of North American cities. The course reviews use types, use characteristics, and use relationships in terms of conflicting social and economic demands. Concepts of organizing urban space in the past and present are reviewed. Physical planning, site planning and urban design issues are discussed. Student-Faculty Research Fall or spring. 1–4 credits. Limited to undergraduate students in the Urban and Regional Studies Program. S-U grades only. Research, reading, and/or writing project in which a student and faculty member choose a topic related to urban and regional studies. Honors Thesis Research Fall or spring. 4 credits. Limited to Urban and Regional Studies Program majors who have been selected as honor students by the department faculty. Each selected student works with his or her thesis adviser. Honors Thesis Writing Fall or spring. 4 credits. Prerequisite: Completion of CRP 492. Each selected student works with his or her thesis adviser. Special Topics Fall, spring, summer. 4 credits. Hours to be arranged. Supervised Readings Fall or spring. Variable 4 credits. Limited to upperclass students. Prerequisite: permission of instructor. Courses numbered from 500 to 599 and 600 to 699 are generally considered introductory or first-year courses, while courses numbered from 700 to 799 and 800 to 899 are generally considered more advanced. Upperclass undergraduate courses are numbered from 300 to 499. (Undergraduate students with the necessary prerequisites and permission of the instructor may enroll in courses numbered 500 and above.) Public and Spatial Economics for Planners Fall. 3 credits. Letter grade. No prior knowledge of economics. Covers basic microeconomic theory and some topics in macroeconomics. What distinguishes it from foundation courses in economics is that the context of every topic is both spatial and public. The concept of space is central to city and regional planning, and the perspective of the public and nonprofit sectors is the perspective of city and regional planning. Both space and the public-nonprofit sectors are peripheral to (or absent from) the usual graduate foundations courses in economics. The course will also cover the economic theory necessary to understand the many applications of economics presented in subsequent courses in city and regional planning. Industrial Restructuring: Implications for State and Local Policy (also CRP 417) Fall or spring. 4 credits. For description, see CRP 417. Statistical and Mathematical Concepts for Planning Fall. 3 or 4 credits. An introduction to statistical and mathematical concepts and methods of importance in planning and policy analysis. Topics will include matrix algebra, probability, sampling, estimation, and regression as well as the use of a microcomputer statistical package. Mathematical Foundation for Planning Analysis Fall. 1 credit. Students only. Meets for two hours, once each week, for approximately half the semester. Review of mathematical foundations for planning analysis. Topics include probability statistics, mathematical functions, and matrix algebra. Intended for students who have not taken a microcomputer statistical course as a refresher course in preparation for higher-level courses in planning analysis. Departmental permission required. Introduction to Computers in Planning For description, see CRP 421. Real Estate Development Process Fall. 3 credits. Examination of various forms of development as well as the role of major participants in the processes. Review issues in residential, retail, industrial, office, and low-income housing projects. Some guest speakers and case studies. Real Estate Marketing and Management Spring. 3 credits. The course focuses on the tenant or user as the basic source of the value of real estate. Students explore the characteristics and needs of tenants, and how the ownership and
management of buildings respond to these needs. Office buildings are considered in detail while key elements common to the operation and marketing of all types of property are reviewed. Topics include examination of tenant types, factors creating preferred locations, building services and operations, negotiation of lease agreements, marketing campaigns, and governmental regulations. Guest speakers and case studies.

CRP 541 The Politics of Technical Decisions I (also Government 528 and Science and Technology Studies 415)
Spring. 4 credits. For description, see S&TS 415.

CRP 545 Introduction to Public Policy Analysis and Management
For description, see CRP 321.

CRP 546 Conflict Resolution in Community and Environment
Fall. 3 credits.
This course will explore the theories and techniques of conflict resolution as they apply to communal, environmental, and related public policy disputes. Analysis will complement skill-building. Issues of power, participation, and strategy are central to our examinations of negotiation and mediation practice.

CRP 547 American Indians, Planners, and Public Policy (also CRP 363)
For description, see LA 563.

CRP 548 Social Policy and Social Welfare (also CRP 448)
Spring. 4 credits. For description, see CRP 448.

CRP 549 Ethics and Practical Judgment in Planning
Spring. 4 credits variable.
An introduction to problems of practical judgment and ethics as they arise in planning and public-serving professional practice. Issues such as consent, interests, deliberation, and legitimacy are central concerns.

CRP 550 Built Environment
Fall or spring. 3 credits.
This course is intended to introduce graduate-level students to the study of the built environment. This course will include: 1) theoretical approaches to the study of the built environment; 2) an introductory survey of the literature on built environment "elements," such as streets, grids, houses, 3) consideration of methods used to understand how people affect and are affected by their immediate environment; and 4) special topics, particularly, historic landscapes and historic preservation. This course will emphasize examples from the United States but some international comparisons will be drawn.

CRP 551 Environmental Law (also CRP 451)
Fall. 4 credits. For description, see CRP 451.

CRP 552 Urban Land-Use Planning I
Fall. 3 credits.
Surveys, analyses, and plan-making techniques for guiding physical development of urban areas; location requirements, space needs, and interrelations of land uses. Emphasis on residential, commercial, and industrial activities and community facilities; housing and neighborhood conditions. Lectures, seminars, and field exercises.

CRP 553 Urban Land-Use Planning II
Spring. 3 credits. Prerequisite: CRP 552 or permission of instructor.
In-depth consideration of special issues in urban land-use planning, such as industrial districts, large-scale integrated development, Planned Unit Development, public and institutional factors, open space, land banking, central business districts, neighborhoods, energy impacts, transportation impacts, and others.

CRP 555 Urban Systems Studio (also Landscape Architecture 701)
Fall. 6 credits. Prerequisite: permission of instructor.
Application of urban design and town planning techniques to specific contemporary problems of city environments. Issues of urbanism are investigated and applied to physical design interventions involving the street, square, block, garden, and park systems. Topics covered in the studio include urban land-use development, spatial systems and aesthetics, and public and private implementation of urban-design plans. This is a specially arranged collaborative studio with the Landscape Architecture Program.

CRP 557 City Planning Design Studio
Spring. 4 credits. Prerequisite: previous design courses or permission of instructor.
A series of individual and team small area design projects at district, neighborhood, and project scale. The course objective is to develop an understanding of the spatial issues, knowledge, and skills needed to design for the functional, aesthetic, social, and cost needs of urban communities. Studio projects, field trips, and reading.

CRP 558 City and Regional Planning Workshop
Fall and spring. 4 credits. S-U only. Students work on urban issues, such as housing, traffic and parking, economic development, zoning, and related planning issues, with public or non-profit organizations in New York State. Projects are undertaken on a community-service basis for "clients" who specifically request planning assistance. Students work individually or in teams.

CRP 560 Documentation for Preservation (also Architecture 586)
Fall or spring. 3 credits.
Methods of identifying, recording, collecting, processing, and analyzing information dealing with historic and architecturally significant structures, sites, and objects.

CRP 561 Historic Preservation Planning Workshop: Surveys and Analyses (also Architecture 588)
Fall or spring. 4 credits.
Techniques for the preparation of surveys of historic structures and districts; identification of American architectural styles, focusing on upstate New York, and explorations of local historical resources, funding sources, and organizational structures. Lectures and training sessions. Emphasis on fieldwork with individuals and community organizations.

CRP 562 Perspectives on Preservation (also Architecture 585)
Fall. 3 credits.
Introductory course for preservationists. A survey of the historical development of preservation activity in Europe and America leading to a contemporary comparative overview. Field trips to notable sites and districts.

CRP 563 Problems in Contemporary Preservation Practice (also Architecture 584)
Spring. Variable credit.
A review and critique of ongoing preservation projects and an investigation of areas of expertise currently being developed. Presented by staff and guest lecturers.

CRP 564 Building Materials Conservation (also Architecture 587)
Spring. 3 credits. Open to juniors, seniors, and graduate students.
A survey of the development of building materials in the United States, beginning during the nineteenth and early twentieth centuries, and a review of the measures that might be taken to conserve them.

CRP 565 Fieldwork or Workshop in History and Preservation
Fall or spring. Variable credit.
Work on applied problems in history and preservation planning in a field or laboratory setting or both.

CRP 567 Measured Drawing (also Architecture 583)
Fall. 3 credits. For undergraduate architecture students and graduate students in history and preservation. Prerequisite: permission of instructor.
Combines study of architectural drawing as historical documents with exercises in preparing measured drawings of small buildings. Presents the basic techniques of studying, sketching, and measuring a building and the preparation of a finished drawing for publication.

CRP 574 Legal Aspects of International Planning
Fall. 3 credits. Offered alternate years. Not offered 1995-96.
Legal systems vary substantially around the world. Planners operate within the parameters established by the legal system of the nation in which they are working. This course allows each student to examine the legal structure of a particular nation (chosen by the student) and to explore how that country's legal system shapes/controls decisions regarding the use, management, and development of land resources. The course emphasizes written and oral presentations.

CRP 581 Principles of Spatial Design and Aesthetics (also Landscape Architecture 480)
For description, see CRP 481.

CRP 582 Urban Housing: Sheltered vs. Unsheltered Society
For description, see CRP 382.

CRP 604 Urban Economics
For description, see CRP 404.

CRP 609.03 Special Topic: Introductory Workshop
Fall. 2 credits.
A short intensive workshop course designed to engage entering MRP students and selected faculty in a simulated world-planning problem. Group problem solving, oral and written report presentation and graphics.

CRP 613 The Political Economy of Gender and Work (also Women's Studies 613)
Fall. 3 credits. Not offered 1995-96.
This course focuses on different approaches to the analysis of gender and work, combining economic and feminist theory. Topics
include: gender, economic rationality and the rhetoric of economics; household theory; gender and the labor market; wage differentials; discrimination, and labor market policies; gender and technology; economic restructuring and women’s work; gender and demographic change; issues in reproductive technologies. The empirical material in the course concentrates mostly, but not exclusively, on the United States.

CRP 614 Gender and International Development (also Women’s Studies 614) Spring. 3 credits.
This course has four main objectives. First, to provide an analysis of the location of women in processes of development and to understand the centrality of gender in each case. Second, to examine theoretical and conceptual frameworks for the analysis, including an understanding of gender divisions and their interaction with other forms of inequality such as class, race, and ethnicity. Third, to reflect upon the linkages between the global economy and the gendered macro and micro processes of development. Fourth, to provide a basis for research, practical action, and policy formulation and for evaluating directions and strategies for social change.

This graduate-level seminar explores the relationship between the persons who do planning and the community, political, and social movement context for planning. A range of political models is addressed, and literature in politics, sociology, and organizational theory is part of the coverage. Methodology of field research is part of the course, and students will be encouraged to design research that puts them in touch with actual cases, persons, and recent local histories.

CRP 616 Development and Change in the World Economy Spring. 3 credits. Letter grade only.
This course concentrates on the current dynamics of international development, the globalization of national economies, and the forces and trends that are shaping this process. Beginning with an analysis of economic restructuring taking place late in the 20th century, the emphasis is on the factors affecting the new international division of labor and production, the labor market, consumption, trade, and finance, and the distribution of resources. This includes the analysis of processes through which the current neoliberal model is being built, such as trade liberalization, labor market flexibilization, the erosion of nation states as economic units, and the formation of trade blocs and global institutions.

CRP 619.01 Special Topic: Planning Practice and Urban Structure Fall. 4 credits.
This introductory graduate seminar has several objective. It exposes students to the theory and history of (1) planning, administration, and related public intervention in urban affairs; (2) the growth and development of cities; and (3) the built environment. Topics are analyzed from the perspective of political economy. Students improve their understanding of the planning process and of the urban application of the social sciences, get practice in writing short papers, and explore one research topic in depth.

CRP 620 Planning Analysis Spring. 4 credits.
A survey of commonly used techniques for analyzing various aspects of suburban social and economic systems. Emphasizes planning applications.

CRP 621 Local Economic Policy—Field Workshop Fall or spring. 4 credits.
A group policy analysis exercise in an upstate New York city. Students do a combination of data analysis, interviews with business, and public leaders, and problem papers addressed to current issues presented by a client group. Individual work is synthesized into a comprehensive report at the end of the semester.

The purpose of this course/workshop is twofold: 1) to provide students with research tools useful in developing state-level economic development strategies, and 2) to provide a critical understanding of the primary economic development strategy used by U.S. state policymakers: firm specific subsidies. The course will consist of lecture and discussion meetings. The workshop sessions will include interactive qualitative information gathering on economic development topics; use of the census in combination with geographic information systems for analysis and presentation; and shift-share analysis.

CRP 639.05 Special Topic: Regional Development, Planning, and the Market, with Emphasis on the Third World-I: Historical and Theoretical Perspective Fall. 4 credits variable.
Historical and conceptual background, and relevant case material, for dealing with urban and regional development using production analysis with a focus on the Third World. Consequences of the organization of production for urban-rural and regional interactions will be emphasized. This historically oriented theoretical framework will be compared to location, central place, and interregional feedback theories.

The course focuses on what the market can or cannot accomplish in terms of guiding economic, industrial, and regional development. Points of view represented range from completely unrestricted market operations to proactive industrial development policies in market contexts. Lessons are drawn for Third World regional development policy drawn from the experiences.

CRP 642 Critical Theory and the Micro-politics of Practice Spring. 4 credits variable.
Trying to “solve problems,” planners and policy analysts set agendas, shape participation, negotiate relations of power. This seminar explores theories illuminating the communicative micro-politics of their daily practice. We explore issues of power and discourse, practical judgment and deliberation, productive and reproductive aspects of ordinary speech and action.

CRP 649.08 Special Topic: Neighborhood Planning Workshop Spring. 4 credits.
The course immerses the student in the urban neighborhood as a unit for policy-making and planning. A three-phased approach is used to help students appreciate and understand the neighborhood as a social, cultural, and political unit. Learning experiences consist of lectures, seminar discussions, projects, in-class exercises and presentations by guests.

CRP 655 Preservation Planning and Urban Change Fall. 3 credits.
An examination of fundamental planning concepts and issues as they relate to historic preservation. Neighborhood revitalization, federal housing programs, the role of public and private institutions, displacement, and other social issues are among the primary topics.
CRP 666 Pre-Industrial Cities and Towns of North America (also CRP 360)
Spring. 3 credits. S-U grades optional. For description, see CRP 360.

CRP 670 Regional Planning and Development in Developing Nations
Fall or spring. 4 credits. Prerequisites: second-year graduate standing. Extensive case studies of development planning are analyzed. Focus is on the political economy of the process of regional development through urbanization and in particular on the concepts of equity and efficiency, external economies, export linkages, and internal self-sufficiency and integration. Resource development, national integration, human development, and migration problems are discussed.

CRP 671 Seminar in International Development
Spring. 1 credit. S-U grades only. The international planning lecture series sponsors lectures by visiting scholars or professionals in the field of international development and planning. The only formal requirement for the course is a brief evaluation of the series at the end of the semester.

CRP 673 Economics of Regional Development
Fall or spring. 2 or 4 credits. This course deals with the historical process of regional and metropolitan development, emphasizing third world problems. While its basic approach is mode-of-production analysis, it also critically surveys location, comparative advantage, and feedback system theories. Development is interpreted as the penetration of the capitalist mode of production into precapitalist societies. Its forces are analyzed both in terms of the historical stages of expanding capitalism (mercantile phase, imperialism, multinationals) and in terms of the pre-existing (feudal, Asiatic) precapitalist mode of production. Regional and urban development planning problems are discussed in the light of the contradictions of the above process, as well as in the context of newly emerging third world socialist countries.

CRP 675 Seminar in Project Planning in Developing Countries
Spring. 4 credits. An examination of the problems and issues involved in preparing project proposals for presentation to funding agencies. Topics include technical design, financial feasibility, social impact analysis, and policy relevance, as well as techniques for effective presentation of proposals. The course is organized as seminar-workshop providing both an analysis of the critical elements of effective proposals and an opportunity to use those elements in the preparation of proposals. A multidisciplinary perspective is emphasized.

CRP 703 Contemporary Theories of Regional Development
Fall or spring. 4 credits. An advanced seminar, mainly for doctoral candidates, to review recent contributions to the literature. After a fast-paced review of basic material in political economy, students will read and present summaries of works by major contemporary theorists. A final paper is required.

CRP 711 Planning and Organization Theory
Fall or spring. 4 credits. Advanced seminar on theoretical models of planning and urban structure. The first part of the course, which may be taken separately for one credit, provides an overview of administrative issues affecting planning. Next, attention is given to theories of organizational structure, growth, and change. Final sessions are devoted to the influence of urban and regional structures as context. Critical reading, short papers, and seminar discussion characterize the course.

CRP 720 Quantitative Techniques for Policy Analysis and Program Management
Fall. 4 credits. Selected analytical techniques used in the planning and evaluation of public policy and public investments are examined. Topics include simulation modeling, benefit-cost and cost-effectiveness analysis (including capital budgeting), and optimization strategies.

CRP 730 Methods of Regional Science and Planning I
Fall or spring. 4 credits variable. An introduction to some of the major methods and models used in regional science and planning. This course is half of a two semester sequence (see CRP 731). Either course may be taken first. Both courses will cover topics related to the structure and assumptions of the models, model development, and their applications in regional science and planning. Where appropriate, computer implementation will be considered. The spring semester emphasizes statistical and econometric models.

CRP 731 Methods of Regional Science and Planning II
Fall or spring. 4 credits. See CRP 730. The fall semester will provide an introduction to deterministic methods and models such as input/output models, social accounting models, and optimization models.

CRP 732 Methods of Regional Science and Planning III
Fall or spring. 3 credits. Prerequisites: CRP 730 and CRP 731 or permission of the instructor. An introduction to the design and implementation of Social Accounting Matrix and Computable General Equilibrium models and their uses, primarily in a regional context, for planning and policy analysis. The use of econometric methods and CGE models will be discussed. The GAMS software package will be used in related computer exercises.

CRP 733 Seminar in Regional Models
Fall or spring. 3 credits. S-U grades optional. Prerequisites: sufficient methodological background to read the current literature. Not offered 1995-96. A review of the classical and important current literature on socioeconomic and/or environmental models of subnational regions. Each student will be expected to identify his or her own area of interest and critically review and report to the class on important papers in that area.

CRP 777 Theories of Development and Underdevelopment
Spring. 3 credits. Various theories attempting to analyze and explain the phenomena of underdevelopment are examined. Although a range of thought

CRP 790 Professional Planning Colloquium I
Fall. 1 credit. Visiting lecturers treat problems and opportunities in the practice of planning. Topical focus to be announced. The only formal requirements for the course are attendance and a brief evaluation at the semester's end.

CRP 792 Master's Thesis, Project, or Research Paper
Fall or spring. 10 credits variable. S-U grades optional.

CRP 794 Planning Internships
Fall, spring, or summer. 1-12 credits. Combines a professional planning internship in a metropolitan area with academic study to provide experience and understanding of the planner's role in formulating and implementing plans and policies. Salaried internships in federal or state agencies, legislative offices, and comparable settings include development of research, analysis, and other technical skills. Weekly seminars draw on student field experiences, assigned readings, and guest speakers to examine current issues of federal, urban, and regional policy from the perspective of planning practice.

CRP 795 Master's Thesis in Preservation Planning
Fall or spring. 1-6 credits.

CRP 796 Colloquium Journal Publication Workshop
Fall or spring. 2 credits. S-U grades only. Individual and group projects culminating in the production of a professional journal.

CRP 797 Supervised Readings
Fall or spring. 4 variable credits. Limited to graduate students. Prerequisites: permission of instructor.

CRP 798 Colloquium in Regional Science, Planning, and Policy Analysis
Fall or spring. 1 credit. Presentation and discussion of current research by faculty, visitors, and graduate students working on their dissertations. Typically, the colloquium will meet once a week during the semester.

CRP 800 Advanced Seminar in Urban and Regional Theory I
Fall. 3 credits. Prerequisite: CRP 500. 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 intrastate distribution of population and economic activity are reviewed.

CRP 801 Advanced Seminar in Urban and Regional Theory II
Spring. 3 credits. Prerequisite: CRP 800. A continuation of City and Regional Planning 800, concentrating on recent developments.
CRP 810 Advanced Planning Theory
Fall. 3 credits. Prerequisite: CRP 500 or 710.
A survey of the works of scholars who have contributed to current thinking about planning theory. Alternative assumptions concerning models of man and theoretical concepts concerning the nature of planning today are considered.

CRP 830 Seminar in Regional Sciences, Planning, and Policy Analysis
Fall or spring. Variable—4 credits. S-U grades only. This seminar will provide an opportunity to review some of the literature and current research in regional science, planning, and policy analysis. Specific topics covered will vary each year. Empirical and analytical research will be emphasized. Students will be expected to prepare and present a research paper during the semester on some aspect of the topics under review.

CRP 890 Planning Research Seminar I
Fall or spring. 2 credits. Intended for doctoral candidates in city and regional planning, other students welcome. Presentation and discussion of current problem areas and research by advanced doctoral students, faculty members, and visitors.

CRP 892 Doctoral Dissertation
Fall or spring. 1–2 credits.

Special Topic Courses
Fall or spring. Variable credit. Typical topics are:

CRP 609 Urban and Regional Theory
CRP 619 Planning Theory and Politics
CRP 629 Quantitative Methods and Analysis
CRP 630 Regional Development Planning
CRP 649 Social-Policy Planning
CRP 659 Urban Development Planning
CRP 669 History and Preservation
CRP 679 Planning and Developing Regions
CRP 689 Environmental Planning
CRP 699 Regional Science
CRP 719 Planning Theory and Politics

Landscape Architecture 123

LANDSCAPE ARCHITECTURE

The Landscape Architecture Program at Cornell is jointly sponsored by the College of Agriculture and Life Sciences (in association with the Department of Floriculture and Ornamental Horticulture) and the College of Architecture, Art, and Planning.

The Program

The Landscape Architecture Department offers a four-year Bachelor of Science degree administered through the College of Agriculture and Life Sciences. The Landscape Architecture Graduate Program offers two professional degree alternatives: a two-year graduate curriculum directed to those who have undergraduate degrees in landscape architecture or architecture and a three-year graduate curriculum directed to those who have undergraduate degrees in other fields. Graduate studies in landscape architecture are administered through the Graduate School and lead to a Master of Landscape Architecture degree. Both of these degrees are accredited by the Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects.

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

Course Information

*LA 141 Freehand Drawing
Fall. 3 credits.

*LA 142 Introduction to Landscape Architecture
Spring. 4 credits.

*LA 201 Design, Composition, and Theory
Fall. 6 credits.

*LA 202 Design, Composition, and Theory
Spring. 6 credits.

*LA 261 Urban Archaeology (also CRP 261)
Fall. 3 credits.

*LA 282 The American Landscape
Spring. 3 credits.

*LA 301 Site Design and Detailing
Fall. 6 credits.

*LA 302 Site Design and Detailing
Spring. 6 credits.

*LA 310 Site Engineering
Fall. 4 credits.

*LA 312 Site Construction
Spring. 4 credits.

*LA 360 Pre-Industrial Cities and Towns of North America (also CRP 666)
Fall. 3 credits. Offered alternate years 1995–96/1997–98.

*LA 363 American Indians, Planners, and Public Policy (also CRP 363/547)
Spring. 3 credits.

*LA 401 Advanced Project Studio
Spring. 6 credits.

*LA 402 Urban Design and Planning
Fall. 6 credits.

*LA 410 Computer Applications in Landscape Architecture
Fall or spring. 3 credits.

*LA 412 Professional Practice
Spring. 1 credit.

*LA 480 Principles of Spatial Design and Aesthetics (also CRP 481/581)
Fall. 3 credits.

*LA 483 Design Criticism
Spring. 3 credits.

*LA 486 Experiential Community Design
Spring. 3 credits. Permission of instructor. S-U grades optional.

*LA 487 Experiential Community Design
Fall. 3 credits. Permission of instructor. S-U grades optional.

*LA 491 Design and Plant Establishment (also Hort 491)
Fall. 3 credits.

*LA 494 Special Topics in Landscape Architecture
Fall or spring. 1–3 credits.

LANAR 497 Individual Study in Landscape Architecture
Fall or spring. 1–5 credits; may be repeated for credit. S-U grades optional. Work on special topics by individuals or small groups.

*LA 498 Undergraduate Teaching
Fall or spring. 1–3 credits.

LANAR 501 Theory, Composition, and Design
Fall. 6 credits. Limited to graduate students. Cost of basic drafting equipment and supplies, about $250. Cost of field trip $250.

Basic design principles and processes applied to the design of the outdoor environment. Studio projects focus on the analysis, organization, and form of outdoor space through the use of three-dimensional components including structures, vegetation, and earthform.

*LA 502 Design, Composition, and Theory
Spring. 6 credits.

*LA 505 Graphic Communication I
Fall. 3 credits.

*LA 506 Graphic Communication II
Spring. 3 credits.

*LA 514 Advanced Site Grading
Spring. 3 credits.

LANAR 520 Contemporary Issues in Landscape Architecture
Fall. 2 credits. S-U grades only. Presentations on topics that are current and significant to the environmental design and planning fields. Issues are discussed from a landscape architecture point of view by practitioners and researchers representing a range of professions.

LANAR 524 (522) History of European Landscape Architecture
Spring. 3 credits.

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.

LANAR 525 (521) History of American Landscape Architecture
Fall. 3 credits.

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.

[LA 569 Archaeology on Preservation Planning and Landscape (also CRP 5698)]
Fall. 3 credits. Offered alternative years 1996–97.]

*LA 590 Thesis Seminar
Fall. 2 credits.

*LA 601 Project Design and Application
Fall. 6 credits. Limited to graduate students.

*LA 602 Natural Systems and Planting Design Studio
Fall. 6 credits.

*LA 610 Site Engineering
Fall. 4 credits.

*LA 612 Site Construction
Spring. 4 credits.

*LA 666 Pre-Industrial Cities and Towns of North America (also CRP 666)
Fall. 3 credits. Offered alternate years 1995–96/1997–98.

*LA 680 Graduate Seminar in Landscape Architecture
Fall or spring. 1–3 credits.

*LA 694 Special Topics in Landscape Architecture
Fall or spring. 1–3 credits.

*LA 701 Urban Design and Planning (also CRP 555)
Spring. 6 credits.

LANAR 800 Master's Thesis in Landscape Architecture Fall or spring. 9 credits. Independent research under faculty guidance, leading to the development of a comprehensive and defensible design or study related to the field of landscape architecture. Work is expected to be completed in the final semester of residency.

*Offered through the College of Agriculture and Life Sciences.

FACULTY ROSTER

Baughner, Sherene, Ph.D., SUNY at Stony Brook, Visiting Prof., City and Regional Planning

Beneria, Lourdes, Ph.D., Columbia U. Prof., City and Regional Planning

Bertoia, Roberto, M.F.A., Southern Illinois U. Assoc. Prof., Art

Blum, Zevi, B.Arch., Cornell U. Assoc. Prof., Art

Booth, Richard S., J.D., George Washington U. Assoc. Prof., City and Regional Planning

Bowman, Stanley J., M.F.A., U. of New Mexico. Prof., Art

Cameron, Theresa A., Des. Dr., Harvard U., Visiting Asst. Prof., City and Regional Planning

Christopherson, Susan M., Ph.D., U. of California at Berkeley. Asst. Prof., City and Regional Planning

Clavel, Pierre, Ph.D., Cornell U. Prof., City and Regional Planning

Colby, Victor E., M.F.A., Cornell U. Prof., Emeritus, Art

Crump, Ralph W., B.Arch., Cornell U. Prof., Emeritus, Architecture

Cruvellier, Mark R., M. Eng., Ph.D., McGill U. (Canada). Assoc. Prof., Architecture

Gazmanski, Stan, Ph.D., U. of Pennsylvania. Prof. Emeritus, City and Regional Planning

Daly, Norman, M.A., Ohio State U. Prof., Emeritus, Art

Drennan, Matthew P., Ph.D., New York University. Prof., City and Regional Planning

Evett, Kenneth W., M.A., Colorado Coll. Prof. Emeritus, Art

Forester, John, Ph.D., U. of California at Berkeley. Prof., City and Regional Planning


Goldsmith, William W., Ph.D., Cornell U. Prof., City and Regional Planning

Greenberg, Donald P., Ph.D., Cornell U. Prof., Architecture

Hascup, George E., B.Arch., U. of California at Berkeley. Assoc. Prof., Architecture

Hodgden, Lee F., M.Arch., Massachusetts Inst. of Technology. Prof., Architecture

Hubbell, Kent L., M.F.A.S., Yale. Nathaniel and Margaret Owens Distinguished Alumni Professor of Architecture. Prof., Architecture

Isard, Walter, Ph.D., Harvard U. Prof., City and Regional Planning

Jarzombek, Mark, Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Architecture

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

Kir, Alexander, M.R.P., Cornell U. Prof., Architecture

Kord, Victor, M.F.A., Yale U. Prof., Art

Lewis, David B., Ph.D., Cornell U. Assoc. Prof., City and Regional Planning

Loccy, Jean N., M.F.A., Ohio U. Prof., Art

MacDougal, Bonnie G., Ph.D., Cornell U. Assoc. Prof., Architecture


McMinn, William G., M. Arch., U. of Texas at Austin. Dean. Prof., Architecture


Mikus, Eleanor M., A. of Denver. Prof. Emeritus, Art

Miller, John C., M.Arch., Cornell U. Prof., Architecture


Muikay, Vincent J., M.Arch., Harvard U. Prof., Architecture

Ochshorn, Jonathan M. Urban Design, City College of New York. Asst. Prof., Architecture

Olpadwala, Porus, Ph.D., Cornell U. Assoc. Prof., City and Regional Planning

Otto, Christian F., Ph.D., Columbia U. Prof., Architecture

Ovaska, Arthur, M.Arch., Cornell U. Assoc. Prof., Architecture


Parsons, Kermit C., M.R.P., Cornell U. Prof., City and Regional Planning

Pearman, Charles W., B.Arch., U. of Michigan. Prof., Architecture

Perlus, Barry A., M.F.A., Ohio U., Assoc. Prof., Art

Poleskie, Stephen F., B.S., Wilkes Coll. Prof., Art

Reps, John W., M.R.P., Cornell U. Prof., Emeritus, City and Regional Planning

Richardson, Henry W., M.R.P., Cornell U. Assoc. Prof., Architecture


Saltzman, Sid, Ph.D., Cornell U. Prof., City and Regional Planning

Saull, Francis W., M.S., Harvard U. Assoc. Prof. Emeritus, Architecture

Schack, Mario L., M.Arch., Harvard U. Prof., Architecture

Shaw, John P., M.Arch., Massachusetts Inst. of Technology. Prof., Architecture

Simitch, Andrea, B.Arch., Cornell U. Assoc. Prof., Architecture

Singer, Arnold. Prof. Emeritus, Art

Squier, Jack L., M.F.A., Cornell U. Prof., Architecture

Stein, Stuart W., M.C.P., Massachusetts Inst. of Technology. Prof. Emeritus, City and Regional Planning

Taft, W. Stanley, M.F.A, California College of Arts and Crafts, Asst. Prof., Art

Tomlan, Michael A., Ph.D., Cornell U. Asst. Prof., City and Regional Planning

Trancik, Rojer T., M.L.A.-U.D., Harvard U. Prof., Landscape Architecture/City and Regional Planning

Ungers, O. Mathias, Diploma, Technical U. Karlsruhe (Germany). Prof. Emeritus, Architecture

Victoritz, Thomas, Ph.D., Massachusetts Inst. of Technology. Adjunct Prof., City and Regional Planning


Warke, Val K., M.Arch., Harvard U. Assoc. Prof., Architecture

Wells, Jerry A., B.Arch., U. of Texas. Prof., Architecture

White, Gail S., M.F.A., Boston Museum School and Tufts U. Asst. Prof., Art

Woods, Mary N., Ph.D., Columbia U. Assoc. Prof., Architecture

Zissovici, John, M.Arch., Cornell U., Asst. Prof., Architecture
The Division of Biological Sciences provides a unified curriculum for undergraduate majors enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Courses in biological sciences are integral to many disciplines and are basic requirements in many schools and colleges at Cornell.

Graduate study in the biological sciences is administered by more than a dozen specialized fields within the Graduate School, as described in the Announcement of the Graduate School.

ORGANIZATION

The Division of Biological Sciences is composed of seven sections: Biochemistry, Molecular and Cell Biology; Ecology and Systematics; Genetics and Development; Microbiology; Neurobiology and Behavior; Physiology; Plant Biology; and, in addition, the L. H. Bailey Hortorium and the Shoals Marine Laboratory.

Student services are provided by the division’s Office for Academic Affairs and the Behman Biology Center, both located in Stimson Hall, where academic advice, information on biological sciences course offerings, other important information, and counseling are available for undergraduates. The Office for Academic Affairs also follows the progress of biology majors and works closely with faculty advisers. Additional services and resources of the Biology Center include academic program planning, tutoring, lecture tapes, examination files, and information on undergraduate research opportunities. The center has comfortable areas for studying and relaxing. The Shoals Marine Laboratory, a cooperative venture with the University of New Hampshire, is located on Appledore Island in the Gulf of Maine. Its base office in Stimson Hall provides advising and career counseling for students interested in the marine sciences and administers the SEA Semester program for Cornell students pursuing studies at Woods Hole or aboard the schooner Com initialization or brigantine Cornuth Cramer.

DISTRIBUTION REQUIREMENT

In the College of Agriculture and Life Sciences, the biological sciences distribution requirement (Group B) is for a minimum of 9 credits, including at least 6 credits of introductory biology satisfied by Biological Sciences 109–110, 105–106, 101 and 103 plus 102 and 104, or 107–108 or any combination of the first term of one sequence and the second term of another. Advanced Placement credit may be satisfied by taking a lower-level course (100–103) as well as by the sequence. Students must take an upper-level biology course to complete the distribution requirement in biological sciences. The remainder of the distribution requirement may be satisfied by an upper-level course (200+) offered by the Division of Biological Sciences, other than Biological Sciences 152, 200 (except by permission of associate director), 202, 205, 206, 208, 209, 301, or 367. The following courses are especially suitable for the distribution requirement because they have no prerequisites: Biological Sciences 101–104, 105–106, 107–108, 109–110, 154, 160, 170, 184, 192, 201, 207, 212, 246, 265, 275. Note that introductory biology can only count for distribution credit when taken as a two-semester sequence: 109–110, 105–106, or 101 and 103 plus 102 and 104, or 107–108, or a combination of the first term of one sequence and the second term of another. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) may be applied to the Group 1 distribution area in accordance with regulations stipulated by the Arts College.

In the College of Human Ecology, the natural sciences distribution requirement is for at least 6 credits selected from Biological Sciences 109–110, 101 and 103 plus 102 and 104, 105–106 or 107–108 or from specified courses in chemistry or physics. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) also satisfies the distribution requirement in the natural sciences. Note: Biological Sciences 101–102–103–104 should be taken as a unit by students of any college except those with advanced placement credit.

Switching from one introductory biology sequence to another at midyear may not be possible because of variation in presentation of topics. Students must receive permission of the instructor to switch sequences. Taking sequences in reverse or inconsecutive order is strongly discouraged.

For College of Arts and Sciences students matriculating after fall 1992, the biological sciences distribution requirement is for a two-semester introductory biology sequence selected from Biological Sciences 109–110, 105–106, or 101 and 103 plus 102 and 104, or 107–108 or any combination of the first term of one sequence and the second term of another. An Advanced Placement score of 4 or 5 fulfills one-half the distribution requirement. Students must take an upper-level biology course to complete the distribution requirement in biological sciences. The remainder of the distribution requirement may be satisfied by an upper-level course (200+) offered by the Division of Biological Sciences, except Biological Sciences 152, 200 (except by permission of associate director), 202, 205, 206, 208, 209, 301, or 367. Anthropology 101, or Chemistry 222 or any combination of the first term of one sequence and the second term of another.

For students in the College of Arts and Sciences who matriculate fall 1992 or later, all courses offered by the Division of Biological Sciences can be used toward fulfillment of the biological distribution requirement except Biological Sciences 152, 200 (unless permission of the associate director is obtained), 202, 205, 206, 208, 209, 301, or 367. The following courses are especially suitable for the distribution requirement because they have no prerequisites: Biological Sciences 101–104, 105–106, 107–108, 109–110, 154, 160, 170, 184, 192, 201, 207, 212, 246, 265, 275. Note that introductory biology can only count for distribution credit when taken as a two-semester sequence: 109–110, 105–106, or 101 and 103 plus 102 and 104, or 107–108, or a combination of the first term of one sequence and the second term of another. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) may be applied to the Group 1 distribution area in accordance with regulations stipulated by the Arts College.

The Division of Biological Sciences provides a unified curriculum for undergraduate majors enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Courses in biological sciences are integral to many disciplines and are basic requirements in many schools and colleges at Cornell.

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In the College of Agriculture and Life Sciences, the biological sciences distribution requirement (Group B) is for a minimum of 9 credits, including at least 6 credits of introductory biology satisfied by Biological Sciences 109–110, 105–106, 101 and 103 plus 102 and 104, or 107–108 or any combination of the first term of one sequence and the second term of another. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) satisfies the requirement for introductory biology. The additional credits may be satisfied by any biological sciences courses except Biological Sciences 152, 200 (unless permission of associate director is obtained), 202, 205, 206, 208, 209, 301, or 367. For College of Arts and Sciences students matriculating after fall 1992, the biological sciences distribution requirement is for a two-semester introductory biology sequence selected from Biological Sciences 109–110, 105–106, or 101 and 103 plus 102 and 104, or 107–108 or any combination of the first term of one sequence and the second term of another. An Advanced Placement score of 4 or 5 fulfills one-half the distribution requirement. Students must take an upper-level biology course to complete the distribution requirement in biological sciences. The remainder of the distribution requirement may be satisfied by an upper-level course (200+) offered by the Division of Biological Sciences, except Biological Sciences 152, 200 (except by permission of associate director), 202, 205, 206, 208, 209, 301, or 367. Anthropology 101, or Chemistry 222 or any combination of the first term of one sequence and the second term of another.

For students in the College of Arts and Sciences who matriculate fall 1992 or later, all courses offered by the Division of Biological Sciences can be used toward fulfillment of the biological distribution requirement except Biological Sciences 152, 200 (unless permission of the associate director is obtained), 202, 205, 206, 208, 209, 301, or 367. The following courses are especially suitable for the distribution requirement because they have no prerequisites: Biological Sciences 101–104, 105–106, 107–108, 109–110, 154, 160, 170, 184, 192, 201, 207, 212, 246, 265, 275. Note that introductory biology can only count for distribution credit when taken as a two-semester sequence: 109–110, 105–106, or 101 and 103 plus 102 and 104, or 107–108, or a combination of the first term of one sequence and the second term of another. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) may be applied to the Group 1 distribution area in accordance with regulations stipulated by the Arts College. In the College of Human Ecology, the natural sciences distribution requirement is for at least 6 credits selected from Biological Sciences 109–110, 101 and 103 plus 102 and 104, 105–106 or 107–108 or from specified courses in chemistry or physics. Advanced placement in biology with a score of 4 or 5 (6 or 8 credits, respectively) also satisfies the distribution requirement in the natural sciences. Note: Biological Sciences 101–102–103–104 should be taken as a unit by students of any college except those with advanced placement credit.

Switching from one introductory biology sequence to another at midyear may not be possible because of variation in presentation of topics. Students must receive permission of the instructor to switch sequences. Taking sequences in reverse or inconsecutive order is strongly discouraged.
THE MAJOR

The Division of Biological Sciences offers a major in biological sciences to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. The undergraduate program is coordinated for students in both colleges through the division's Office for Academic Affairs, where students submit their applications to the major and obtain biology faculty advisers.

During the second semester of the sophomore year, all students who intend to major in biological sciences must apply for acceptance into the major with the associate director for academic affairs, in 200 Stimson Hall. Students in the College of Agriculture and Life Sciences who were admitted directly to the major complete the application process to declare a program of study area and to assure satisfactory progress toward completion of the major. Acceptance into the major requires completion of the course sequences in introductory biology, chemistry, and mathematics (see requirements 1-3, below), plus one semester of organic chemistry lectures. In addition, a 2.75 cumulative grade-point average is required for final acceptance into the major except for those students admitted directly to the major as freshmen (College of Agriculture and Life Sciences students only) or as transfers. Students in the process of completing these prerequisites for admission to the major may be accepted on a provisional basis. Final acceptance into the major is required for graduation with a biological sciences major. It is the student's responsibility to assure that final acceptance has been granted. Whenever possible, students should include the introductory biology, chemistry, and mathematics sequences in their freshman schedule and complete the organic chemistry lecture course in their sophomore year. Students are not encouraged to continue with the major in biological sciences unless performance in these four subjects gives evidence of capacity to perform satisfactorily at a more advanced level.

The requirements for the biological sciences major are listed below. These courses, with the exception of the language requirement, should be taken for a letter grade, unless the course is offered for S-U grades only.

1) **Introductory biology for majors**

   (one year): Biological Sciences 101 and 103 plus 102 and 104, or 105–106. Biological Sciences 107–108, offered during the eight-week Cornell Summer Session for 8 credits, also satisfies the introductory biology requirement for majors. Students may choose to accept advanced placement if they have received a score of 5 on the Advanced Placement Examination of the College Entrance Examination Board (CEEB). Students with a score of 4 must fulfill the introductory biology requirement by taking Biological Sciences 101–102, 101 and 103, 102 and 104, or 103–104. These students should consult information available in the course office (1140 Comstock Hall) and in the Biology Center (216 Sinton Hall) to determine which semester to take to complete the introductory biology requirement. For students in doubt, completion of Biological Sciences 101 and 103 is advised. These students receive a total of 8 introductory biology credits (4 AP credits plus 4 course credits).

2) **General chemistry**

   (one year): Chemistry 207–208,* or 103–208, or 215–216,* or 103–104–208.

3) **College mathematics**

   (one year): two semesters of calculus (Mathematics 111–112, 192 or their equivalents) or one semester of calculus plus either Mathematics 105 or Statistics and Biometry 102. Education 115 may not be used to fulfill any part of this requirement.

4) **Organic chemistry**: Chemistry 253 and 251, or 253 and 301, or 357–358 and 251, or 357–358 and 301, or 359–360 and 251, or 359–360 and 301.

5) **Physics**: Physics 207–208,* 112–213,* or 101–102. Those who take Physics 112–213 are advised to complete Physics 214 as well.

6) **Genetics**: Biological Sciences 281.

7) **Biochemistry**: Biological Sciences 330, or 331 or 333.

8) **Evolutionary Biology**: Biological Sciences 278.

9) A program of study selected from the outline below.

10) **Foreign language**: students registered in the College of Agriculture and Life Sciences must satisfy the foreign language requirement of the Division of Biological Sciences by (a) presenting evidence of successful completion of three or more years of study of a foreign language in high school or (b) attaining a score of 560 or more on the reading portion of the College Entrance Examination Board achievement test or (c) achieving "qualification" status in a language as defined by the College of Arts and Sciences or (d) successfully completing at least 6 college credits in a foreign language. Students registered in the College of Arts and Sciences must satisfy the language requirement as stated by that college.

   *Since modern biology has an important physical and quantitative orientation, students are advised to undertake basic science courses that emphasize this approach. Asterisks in the above list indicate the courses that provide this orientation, but all courses listed are acceptable.

   Although not required for the biological sciences major, a course in statistics is recommended for students planning graduate study or a research career. Students should consult their faculty advisers when choosing appropriate courses in statistics.

The possible programs of study are listed below.

1) **Animal Physiology**: BIOAP 311, Introductory Animal Physiology, Lectures; BIOAP 313, Histology: The Biology of Tissues; BIOAP 316, Cellular Physiology, and BIOAP 441, Animal Physiology Experimentation. The Program of Study in Animal Physiology emphasizes whole-animal, tissue, and cell physiology, and provides considerable opportunity for students using live animals. It is intended especially for students contemplating careers in biomedical practice or research.

2) **Biochemistry**: Quantitative Chemistry (Chemistry 300 or completion of Chemistry 215–216 for the general chemistry requirement for the major), a minimum of four credits of organic chemistry laboratory (Chemistry 301–302 or 251–252–302 or 301 or 251–252), one of the five-credit options of Biochemistry (331 and 332 or 330 for 5 credits) is strongly recommended, 4 credits of biochemistry laboratory courses (BIOBM 630 and 634, or 630 and 638, or 634 and 638, or 430) (see note below); and Physical Chemistry (Chemistry 390–390.1 or 287–288 or 287–390.1 or 389–288). Note that Chemistry 288 is designed for biologists. It is recommended that students interested in graduate work in biochemistry take these rigorous organic chemistry and physics sequences (Chemistry 357–358 or 359–360 and Physics 207–208), six credits of organic chemistry laboratory, and a third semester of calculus in preparation for the more rigorous physical chemistry sequence (Chemistry 389–390). Students interested in biochemistry should complete a year of introductory chemistry other than Chemistry 103–104 before the start of their sophomore year. Students are also urged to complete introductory biology in their freshman year.

Note: The 600-level biochemistry laboratory courses are each one-half semester long. Students may register for two of these courses in a single semester, for a total of 4 credits. The specific courses offered in any semester may vary. All courses emphasize qualitative and quantitative aspects of modern approaches to research in biochemistry, molecular and cell biology, and expect some student input into experimental design based on readings of original papers.

3) **Cell Biology**: Chemistry 300 or 215–216, Quantitative Chemistry; BIOBM 432, Survey of Cell Biology; 4 credits of biochemistry laboratory courses (strongly recommended either 630 and 634, or 630 and 636; or 634 and 638) (see "Note" under Biochemistry); and at least 5 additional credits chosen from the following courses: BIONB 222, Neurobiology and Behavior II; Introduction to Neurobiology; BIO G 305, Basic Neurobiology; BIOAP 313, Histology: The Biology of the Tissues; BIOPL 345, Plant Anatomy; BIOBM 435–436, Undergraduate Biochemistry Seminar; BIOBM 437, Oncogenes and...

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 and are strongly encouraged to take one of the 5-credit options of Biochemistry (331 and 332 or 350 for 5 credits). If graduate work in cell biology is anticipated, students should consider taking a physical chemistry sequence (Chemistry 389–390.1 or 287–288 or 287–390.1 or 389–290).

4) Ecology and Evolutionary Biology: BIOES 261, Ecology and the Environment; and 10 credits from the following course lists, including at least one course from each group:

(a) BIOI 241, Introductory Botany; BIOES 274, Functional and Comparative Morphology of Vertebrates; BIOES 373, Biology of the Marine Invertebrates; BIOES 466 and 468, Physiological Plant Ecology. Lectures and Laboratory; BIOES 471, Mammalogy; BIOES 472, Herpetology; BIOES 475, Ornithology; BIOES 476, Biology of Fishes; ENTO 212, Insect Biology.


Note: One 400-level, 4-credit course offered at Shoals Marine Laboratory may be applied toward the 10 credits. Students are encouraged to gain experience in some aspect of field biology through course work at a biological field station or work experience.

5) General Biology: The Program of Study in General Biology requires a minimum of 15 credit hours from courses offered by the Division of Biological Sciences in addition to courses counted toward requirements 1–4 above. These credits must include one course (200-level or above) from the courses listed for at least three of the eight other programs of study (see pages 124–125), and must include a course with a laboratory (200-level or above) and a minimum of two upper-level (300 and above) courses of two or more credits. BIO G 498 may not be used as one of the upper-level courses. BIO G 499 (minimum of 2 credits, but no more than 3 credits) may count as one of the upper-level courses, and may count as the laboratory course with approval of the adviser.

6) Genetics and Development: A minimum of 13 credits, usually chosen from the following courses: BIOGD 385, Developmental Biology; BIOGD 389, Embryology; BIONB 423, Neurogenetics; BIOGD 483, Yeast Genetics and Molecular Biology; BIOES 470, Ecological Genetics; BIOGD 483, Molecular Genetics and Society; BIOGD 484, Molecular Aspects of Development; BIOGD 484, Molecular Evolution; BIONM 485, Bacterial Genetics; BIOGD 633, Biosynthesis of Macromolecules; BIODM 639, The Nucleus; BIOPL 641, Lab and Plant Molecular Biology; BIOPL 644, Plant Growth and Development; BIOPL 652, Plant Molecular Biology II; BIOPL 653, Plant Molecular Genetics; BIOPL 663, Theoretical Population Genetics; BIOGD 685, Evolutionary Ecology; BIOGD 686, Insect Ecology; BIOGD 687, Evolutionary Genetics; BIOMI 694, Genetics of Diverse Bacteria; PL BR 606, Advanced Plant Genetics.

Up to 3 credits for this program of study may be chosen from other biological sciences courses with approval of the faculty adviser.

7) Microbiology: BIOMI 290, General Microbiology; Lectures: BIOMI 291, General Microbiology, Laboratory; BIOMI 300, Seminar in Microbiology; BIOMI 391, Advanced Microbiology, Laboratory; and at least 5 credits from the following course lists, including at least one course from each group:

(a) BIOMI 485, Bacterial Genetics; or
(b) BIOMI 416, Microbial Physiology; and
(b) BIOMI 415, Bacterial Diversity; or
(c) BIOMI 451, Structure and Function of Bacterial Cells.

8) Neurobiology and Behavior: The two-semester introductory course sequence, Neurobiology and Behavior I and II (BIONB 221 and 222) with discussion section (4 credits per term), and 7 additional credits, among which must be a course from the neurobiology and behavior offerings. BIONB 420, BIO G 498 and 499, and BIONB 720 may not be used as this neurobiology and behavior course. However, these readings and independent research courses may form part of the additional credits (beyond those provided by the advanced neurobiology and behavior course) required to complete the Program of Study in Neurobiology and Behavior.

Note: Students who declare the Program of Study in Neurobiology and Behavior after taking BIONB 221 or 222 for only 3 credits must complete additional course work in neurobiology and behavior. These students should consult the chair of the Section of Neurobiology and Behavior (W363 Seeley G. Mudd Hall) to determine what course(s) to use to make up the deficiency.

9) Plant Biology: Students choose one area of study from the following two options:

Option (a) Botany: Students are required to take Introductory Botany (BIOPL 241). Students should then choose, with the aid of their faculty adviser, a minimum of three of the following courses, for a total of at least 10 additional credits, to round out their botanical training. BIOPL 242 and 244, Plant Physiology, Lectures and Laboratory; BIOPL 246, Plants and Civilization; BIOPL 249, Taxonomy of Vascular Plants; BIOPL 342 and 344, Plant Physiology, Lectures and Laboratory; BIOPL 343 and 347, Molecular Biology and Genetic Engineering of Plants and Laboratory; BIOPL 345, Plant Anatomy; BIOPL 359, Biology of Grasses; BIOPL 444, Plant Cell Biology; BIOPL 445, Photosynthesis, BIOPL 447, Molecular Plant Systematics; BIOPL 449, Plant Evolution and the Fossil Record; BIOPL 463 and 465, Plant Ecology and Population Biology, Lectures and Laboratory; or BIOES 466 and 468, Physiological Plant Ecology, Lectures and Laboratory.

Option (b) Plant Biotechnology: Students are required to take BIOPL 343 and 347, Molecular Biology and Genetic Engineering of Plants, Lectures and Laboratory. Students choose, in consultation with their faculty adviser, a minimum of 10 additional credits from the following list: BIOPL 241, Introductory Botany; BIOPL 242 and 244, Plant Physiology, Lectures and Laboratory; BIOPL 342 and 344, Plant Physiology, Lectures and Laboratory; BIOPL 346, Algal Physiology; BIOPL 444, Plant Cell Biology; BIOPL 648, Plant Biochemistry, PL BR 401, Plant Cell and Tissue Culture; PL BR 402, Plant Tissue Culture Laboratory.

10) Independent Option: A special program for students interested in nutrition is available under this option. Students interested in courses in biophysics should contact the Office for Academic Affairs (200 Stimson Hall) for further information. In addition, students who wish to undertake a course of study not covered by the nine existing programs of study or the special program may petition the Division of Biological Sciences Curriculum Committee. Information on independent options and Curriculum Committee petition forms are available in the Office for Academic Affairs, 200 Stimson Hall.

Independent Research and Honors Program

Individual research projects under the direction of a faculty member are encouraged as an aspect of study throughout the program of study. Applicants for research projects are accepted by the individual faculty members, who take into account students' previous...
academic accomplishments, interests, and goals and the availability of space and equipment suitable for the proposed project. Students interested in independent research enrollment in Biological Sciences (BIO G) 499 (Undergraduate Research in Biology) with the written permission of the faculty supervisor. Students register for this course in 200 Stimson Hall. Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to take full responsibility for the quality of the work. Information on faculty research activities and undergraduate research opportunities is available in the Behman Biology Center, 216 Stimson Hall.

Research credits may not be used in completion of the following program of study areas: animal physiology, biochemistry, cell biology, ecology and evolutionary biology, genetics and development, microbiology, plant biology. No more than 4 credits of research may be used in completion of the Program of Study in Neurobiology and Behavior. The honors program in biological sciences is designed to offer advanced training in laboratory or field research through the performance of an original research project under the direct guidance of a member of the Cornell faculty. Applications for the honors program are available in the Office for Academic Affairs, 200 Stimson Hall, and must be submitted to the Honors Program Committee by the deadline announced early in the senior year. Application forms for the honors program are separate from the enrollment forms for Biological Sciences (BIO G) 499 (Undergraduate Research in Biology). To qualify for the program, students must have been accepted into the biological sciences major, have completed at least 30 credits at Cornell, and have an overall Cornell cumulative grade-point average of at least 3.00. In addition, students must have at least a 3.00 Cornell cumulative grade-point average in at least one biology course and in at least one course in a science other than biology. Many decisions pertaining to the curriculum, courses, and senior requirements may be obtained from the Office for Academic Affairs, 200 Stimson Hall. Information on faculty research activities is available in the Behman Biology Center, 216 Stimson Hall. Deviation from any of the requirements of the Honors Program requires a petition in the form of a letter to the Honors Program Committee, c/o 200 Stimson Hall.

CURRICULUM COMMITTEE

Many decisions pertaining to the curriculum, courses, and senior requirements may be obtained from the Office for Academic Affairs, 200 Stimson Hall. Information on faculty research activities is available in the Behman Biology Center, 216 Stimson Hall. Deviation from any of the requirements of the Honors Program requires a petition in the form of a letter to the Honors Program Committee, c/o 200 Stimson Hall.

ADVISING

Students in need of academic advice are encouraged to consult their advisers, come to the Behman Biology Center (216 Stimson Hall), or contact the associate director for academic affairs (200 Stimson Hall). Students interested in marine biology should visit the Cornell Marine Programs Office, G14 Stimson Hall.

INDEX OF COURSES

The following course identifiers are used to denote biological sciences courses in specific areas: General Courses, BIO G; Animal Physiology, BIOAP; Biochemistry, Molecular and Cell Biology, BIOBM; Ecology and Systematics, BIOES; Genetics and Development, BIOGD, Microbiology, BIOMI; Neurobiology and Behavior, BIONB; Plant Biology, BIOPL, Shoals Marine Laboratory, BIOSM.

Note: Biological sciences courses count as agriculture and life sciences credits for students in the College of Agriculture and Life Sciences and as arts and sciences credits for students in the College of Arts and Sciences.
**GENERAL COURSES (BIO G)**

**BIO G 101-102 Biological Sciences, Lectures**
101, fall; 102, spring. 2 credits each term. Prerequisite: concurrent enrollment in BIO G 103 (fall) or 104 (spring). Passing grade (D or better) in 101 is prerequisite to 102 unless permission is obtained from instructor. May not be taken for credit after BIO G 105–106 or 109–110. S-U grades optional, with permission of instructor. Lecs, M W F 9:05 or 10:10. 2 lecs each week; to accommodate these, students must reserve all 3 days. Evening prelms: fall, Sept. 28 and Nov. 14; spring, Feb. 22 and Apr. 4. K. K. Adler. Designed both for students who intend to specialize in biological sciences and for those who want to obtain a thorough knowledge of biology as part of their general education. The fall semester covers the chemical and cellular basis of life, energy transformations, and cell and tissue biology. The spring semester covers genetics, development, evolution, and ecology. Each topic is considered in the light of modern evolutionary theory.

**BIO G 103-104 Biological Sciences, Laboratory**
103, fall; 104, spring. 2 credits each term. Prerequisite: concurrent enrollment in BIO G 101 (fall) or 102 (spring). 103 is prerequisite to 104 unless permission is obtained from instructor. No admittance after second week of classes. S-U grades optional, with permission of instructor. Lab. M T W or R 1:25-4:25, M or W 7:30-10:30 p.m., or T R or S 8-11. One 3-hour lab each week and a weeklylec for discussions, special lecs, etc. J. C. Glase, P. R. Ecklund, and staff. BIO G 103-104 is designed to provide laboratory experience with major biological phenomena in order to support an understanding of the important concepts, principles, and theories of modern biology. A second objective of the laboratory course is to help students gain expertize in the methods used by biologists to construct new knowledge. Students are exposed to basic concepts, research methods, including laboratory and data transformation techniques, and instrum­mentation in the major areas of biology. First-semester topics include biochemistry, physiology, invertebrate diversity, and behavior. In the second semester, laboratory experience is provided in the areas of genetics, biotechnology, immunology, plant biology, population genetics and growth, and ecology. During the first semester, dissection of a doubly-pithed frog is included. Pithing is done by the instructor. 2 lecs each week; to accommodate these, students must reserve all 3 days. Evening prelms: fall, Sept. 28 and Nov. 14; spring, Feb. 22 and Apr. 4. K. K. Adler. Designed both for students who intend to specialize in biological sciences and for those who want to obtain a thorough knowledge of biology as part of their general education.

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**BIO G 105-106 Introductory Biology**
105, fall; 106, spring. 4 credits each term (or 2 credits, with permission of instructor). Enrollment limited to 200 students. Prerequisite: 105 is prerequisite to 106, unless written permission is obtained from instructor. May not be taken for credit after BIO G 101–104 or 109–110. No admittance after first week of classes. Estimated cost for dissection kit, $111. S-U grades optional, with written permission of instructor. Lec, T 9:05 (1st lec of fall term, R 8/31 9:05); additional study and lab hours to be arranged. C. H. McFadden and staff.

**BIO G 107-108 General Biology**
Summer (8-week session; 107, weeks 1–4; 108, weeks 5–8); 4 credits each. Prerequisite: one year of college or permission of instructor. BIO G 101–103, 105, or 107 is a prerequisite for 108. Fee, $25 for weeks 1–4; $15 for weeks 5–8. Lecs, M-R 9–12; labs, M T R 1:30–4:30, F 9–12. Staff.

Designed for students who plan further study in biology and for students who want a broad course in biology as part of their general education. BIO G 107 covers biological metabolism, first at the molecular level and then progressively to the organism level. The laboratory work involves an introduction to some major techniques, vertebrate dissection, and a survey of plant organization. BIO G 108 seeks to integrate the topics of genetics, development, physiology, population genetics, and evolution, and ecology in a general consideration of biological evolution. The laboratory work is a continuation of the material covered in BIO G 107 and involves more techniques, a survey of animal organization, and the design and performance of a field study. BIO G 107–108 fulfills the introductory biology requirement for majors and forms a suitable introductory biology course sequence for students intending to go to medical school.

**BIO G 109-110 Biological Principles**
109, fall; 110, spring. 3 credits each term. Limited to 600 students. A passing grade in 109 or 101–103 or 105 is prerequisite to 110 unless written permission is obtained from the instructor and the student has at least 3 credits of college biology. Since 109–110 together constitute an integrated survey, 109 cannot be used to satisfy the College of Arts and Sciences or College of Agriculture and Life Sciences distribution requirement unless it is followed by 110 or an exemption is obtained from the instructor. May not be taken for credit after BIO G 101–104 or 105–106. This course sequence may be used to fulfill the distribution requirement in the Colleges of Agriculture and Life Sciences, Arts and Sciences, and Human Ecology but may not be used as an introductory course for the major in biological sciences. Note that this...
course satisfies the prerequisite for many, but not all second- and third-level courses in biology. Letter grade only. Lecs, M W F 9:05 or 10:10; lab, M T W R or F 2:45-2:55 or T R 1:25-1:35. Students do not choose lab sections during course enrollment; lab assignments are made during first day of classes. Each student must attend lab on alternate weeks. Evening prelims: fall, Sept. 28, Oct. 14; spring, Feb. 22 and Apr. 2. C. Eberhard and 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 problemsolving experiments, demonstrations, and discussions. No live dissections are involved; there are dissections of vertebrate and invertebrate material (observation required).

**BIO G 152 Special Topics in Biology** Spring. 1 credit. Limited to 30 students. Permission or performance in BIO G 109 or equivalent and concurrent enrollment in BIO G 102, 105, or 110, or written permission of instructor. S-U grades only. *This course may not be used in fulfillment of college distribution requirements.* Lect, T 7:35; occasional field trips to be arranged. Guest lecturers discuss topics in their field of research interest. C. Eberhard, staff, and guest lecturers.

This course is designed to complement introductory biology by providing an opportunity for deeper exploration of selected topics of interest. Class involvement and discussion are encouraged.


**BIO G 200 Special Studies in Biology** Fall, spring, or summer. 1–3 credits. Prerequisites: transfer- or special-student status and written permission of instructor and of the associate director of the Division of Biological Sciences. Students must register using a special form available in Stimson 200. S-U grades optional, with permission of instructor. Hours to be arranged. Staff.

A registration device for students who want to take only a portion of a regular biological sciences course—for example, only the lectures or only the laboratory in a course that includes both. Only students who have already had training equivalent to the portion of the regular course that is to be omitted may register in this manner. This course may not be substituted for 100-level courses and may not be used in fulfillment of college distribu-

tion requirements except by permission of the associate director of the division.

**BIO G 201 Biotechnology: The "New" Biology (also Biology and Society 201)** Spring. 3 credits. This course is for students majoring in biological sciences. Students who have taken or are currently enrolled in BIOGD 281 or BIOMM 330 or 351 may not enroll. S-U grades optional. Not offered 1995–96. Lecs, T R 2:45–3:25; Lab, T R 3:35–4:25; disc assignments made during week 2. J. M. Fessenden.

MacDonald, J. M. Calvo, S. Howell. Designed for nonmajors, a general introduction to the application and issues of modern molecular biology in medicine and agriculture. Information on recombinant DNA technology, monoclonal antibodies, plant cell culture techniques, and embryo manipulation methods is presented. Topics include medical diagnostics and treatments; environment, agriculture, and food; and economic, social, policy, regulatory, ethical, and legal issues that surround biotechnology. The course is taught in three modules and the topics vary from year to year. Topics for 1995 are human gene mapping and genetic screening, crop plant biotechnology, immunodiagnosticus and therapy, and AIDS and cancer. Recommended for those students who want to understand some new research discoveries, their applications, and social, legal, ethical, and policy issues stemming from them.

**BIO G 207 Evolution (also History 287 and Science and Technology Studies 287)** Fall or summer. 3 credits. Intended for students with no background in college biology. May not be taken for credit after BIOES 278. S-U grades optional. Lecs, T R 10:10; disc, 1 hour each week to be arranged. W. B. Provine.

Evolution is the central concept in biology. This course examines evolution in historical and cultural contexts. Aims of the course include understanding the major issues in the history and current status of evolutionary biology, and the implications of evolution for culture. Issues range from controversies over mechanisms of evolution to its role in the relationship between creationists and evolutionists.

**BIO G 208 Drawing the Human Figure** Summer (6-week session). 3 credits. Labs. M T W 3:00–5:15. K. Kucharski.

Human anatomy. Emphasis on learning correct anatomical information relating to the skeletal and muscular systems as approached through observation and drawing practices.

**BIO G 209 Introduction to Natural Science Illustration** Summer (6-week session). 2 credits. Limited to 12 students. Prerequisites: free-hand drawing or permission of instructor. S-U grades optional. Lecs and labs, T R 6:30–9:30 p.m. B. S. King.

An introduction to the art of natural science illustration focused on the techniques of various media including pencil, pen and ink, watercolor, colored pencil, scratchboard, and carbon dust. Potentials and limitations of line and half-tone reproduction, copyright, and portfolio presentation are discussed.

**BIO G 305 Basic Immunology Lectures (also Veterinary Microbiology 315)** Fall. 3 credits. Strongly recommended: basic courses in microbiology, biochemistry, and genetics. S-U grades optional, with permission of instructor. Lecs, T R 8:30–9:55. Evening prelims: Sept. 28, Oct. 26, and Nov. 16. A. J. Winter.

A survey of immunology, with emphasis on the biological functions of the immune response.

**BIO G 400 Undergraduate Seminar in Biology** Fall or spring. Variable credit (1–3 credits assigned for individual seminar offerings). May be repeated for credit. S-U grades optional. Fee may be charged. From time to time specialized seminars on topics of interest to undergraduates are offered by visiting faculty or faculty from the Sections of Ecology and Systematics, Genetics and Development, or Plant Biology. Topics and instructors are listed in the division’s catalog supplement issued at the beginning of the semester. For students interested in Biochemistry, Physiology, or Neurobiology, please see descriptions under appropriate sections.

**BIO G 401 Introduction to Scanning Electron Microscopy** Fall or spring. Variable credit (1–3 credits assigned for individual seminar offerings). May be repeated for credit. S-U grades optional. Fee may be charged. M. V. Parthasarathy.

An introductory course that includes the principle and use of the scanning electron microscope. Students are provided with material to explore and understand some of the fine biological architecture. In addition to preparing the specimens, the students use the scanning electron microscope to study and obtain micrographs of features that interest them.

**BIO G 403 Transmission Electron Microscopy for Biologists** Fall, 1, 3, or 4 credits (4 credits if student takes both sections). Limited to 12 students. Prerequisites: BIOAP 313, BIOPH 345 or 445, or written permission of instructor. S-U grades optional. Lect, M 10:10; lab, T R F 9:05–12:15 or T W or R 1:25–4:25. Fee may be charged. M. V. Parthasarathy.

Section 01, 1 credit, weeks 1–4, covers the principles and use of the transmission electron microscopy (TEM), with emphasis on proper operation of the instrument and interpretation of images obtained. Negatively stained materials are used for viewing with the transmission electron microscope. Section 02, 3 credits, weeks 5–12, covers the principles and techniques of preparing biological material for transmission electron microscopy. Using animal, plant, and microbe materials this section studies chemical fixatives, cryofixation, ultrathin sectioning, immunogold localization, quantitative microscopy, and metal shadowing techniques. Students have two additional weeks to complete laboratory assignments at the end of each section.
BIO G 450 Light and Video Microscopy for Biologists
Spring. 3 credits. Limited to 12 students. Prerequisites: one or two years of introductory biology and permission of instructor. Lecs, T R 1:25–2:30; lab, R 2:30–4:30. R. O. Wayne.

Theoretical and practical aspects of light microscopy, including brightfield, darkfield, phase-contrast, polarization, Hoffman-modulation contrast, interference, differential-interference contrast, and fluorescence microscopy, as well as video- and computer-based digital image enhancement, are studied. Students learn photographic and quantitative techniques to probe noninvasively the structure and function of living plant cells.

BIO G 467 Seminar in the History of Biology (also History 415, Biology and Society 447, and Science and Technology Studies 447)
Fall. 4 credits. Limited to 18 students. Prerequisite: permission of instructor required; register for course in Corson E139. Sem, T R 12:20–2:15 p.m. W. B. Provine.

Specific topic changes each year. Readings from scientists and historians, sociologists, and philosophers of science. The course helps students to evaluate assertions that the synthesis remains robust and assertions that the synthesis has disintegrated.

BIO G 469 Food, Agriculture, and Society (also Biology and Society 469 and Science and Technology Studies 469)
Spring. 3 credits. Limited to 20 students. Prerequisites: an introductory biology course or permission of instructor. S-U grades optional. Lecs, T R 1:25–2:40. A. G. Power.

A multidisciplinary course dealing with the social and environmental impact of food production in the United States and developing countries. Agroecosystems of various kinds are analyzed from biological, economic, and social perspectives. The impacts of traditional, conventional, and alternative agricultural technologies are critically examined in the context of developed and developing economies. Specific topics include pest management, soil conservation, plant genetic resources, biotechnology, and sustainable development.

BIO G 489 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. Students in the College of Arts and Sciences may not count credits from this course toward the 120 credits required for graduation. S-U grades optional. Lecs, T R 1:25–2:40. A. G. Power.

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 BIO G 105–106; BIOAP 311, 319; BIOM 231, 330, 331, 430; BIOES 274, 475; and BIOM 291, 292.

BIO G 499 Undergraduate Research in Biology
Fall or spring. Variable credit. Students in the College of Arts and Sciences may not register for more than 6 credits per term with one supervisor and 9 credits per term with more than one supervisor. Prerequisite: written permission of staff member who supervises the work and assigns the grade. Students must register in the Office for Academic Affairs in 200 Stimson Hall. Each student must submit an independent study statement describing the proposed research project during course registration. (Special forms for this purpose are available in the college offices and in 200 Stimson Hall.) Any faculty member in the Division of Biological Sciences may act as a supervisor. Faculty supervisors outside the division are acceptable only if a faculty member of the division agrees to serve as co-supervisor, taking full responsibility for the quality of the work. S-U grades optional. Hours to be arranged. Staff.

Practice in planning, conducting, and reporting independent laboratory and library research programs. Research credits may not be used in completion of the following programs of study: animal physiology, biochemistry, cell biology, ecology and evolutionary biology, neurobiology and behavior, microbiology, plant biology. No more than 4 credits of research may be used in completion of the program of study in neurobiology and behavior.

BIO G 606 Freeze-Fracture Technique
Spring, weeks 9–14, 1 credit. Primarily for graduate students. Limited to 6 students. Prerequisites: BIO G 403 or equivalent, and permission of instructor. S-U grades only. Lecs, M 10:10; disc to be arranged; labs, M W 1:25–4:25. Fee may be charged. M. V. Parthasarathy.

Principles of freeze-fracturing and freeze-substitution technique, freezing artifacts, and interpretation of images.

BIO G 705 Advanced Immunology Lectures (also Veterinary Microbiology 705)
Spring. 3 credits. Prerequisite: BIO G 305 or permission of instructor. Offered alternate years. Lecs, M W F 9:05. Coordinator: R. G. Bell.

Coverage at an advanced level of molecular and cellular immunology.

BIO G 706 Immunology of Infectious Diseases and Tumors (also Veterinary Microbiology 719)

Coverage at an advanced level of the immunology of diseases caused by selected bacteria, viruses, protozoa, and helminths, and tumor immunology.

Related Courses in Other Departments

The Sea: An Introduction to Oceanography (Biological Sciences [BIOS] 154)

BIOAP 212 Human Physiology for Non-Biology Majors
Spring. 3 credits. May not be taken for credit after BIOAP 311. Limited to 130 students. This course may be used toward the science distribution requirement of the College of Arts and Sciences and the Group B distribution requirement of the College of Agriculture and Life Sciences. This course may not be used to fulfill the requirements of any Program of Study in the biological sciences major. Lecs, M W F 1:25, disc, M W or F 2:15. Evening prelins: Feb. 29 and Apr. 16. P. W. Concannon and staff.

Introduction to the physiology of all major organ systems and the relation of the physiology to human health and disease. Emphasis on understanding of major body functions and control mechanisms regulating each organ system. Students develop a fundamental understanding of how their bodies work that will be the basis of making informed decisions about their own health and medical needs and those of their families. Taught by staff of research physiologists and cooperating physicians.

BIOAP 214 Biological Basis of Sex Differences (also Biology and Society 214 and Women's Studies 214)
Fall. 3 credits. Limited to non-biology majors and sophomore biology majors; junior and senior biology majors may register with permission of instructor. Prerequisite: one year of introductory biology. S-U grades optional. Offered alternate years. Not offered 1995–96. Lecs, T R 8:30–9:35; occasional discussion to be arranged. J. E. Fortune.

The structural and functional differences between the sexes are examined. Emphasis is placed on mechanisms of mammalian reproduction, where possible, special attention is given to studies of humans. Current evidence on the effects of gender on nonreproductive aspects of life (behavior, mental, and physical capabilities) is discussed. The course is intended to provide students with a basic knowledge of reproductive endocrinology and with a basis for objective evaluation of sex differences in relation to contemporary life.

BIOAP 311 Introductory Animal Physiology, Lectures (also Veterinary Physiology 346)
Fall. 3 credits. Prerequisites: one year of college biology, chemistry, and mathematics. Recommended: previous or concurrent course in physics. S-U grades optional, with permission of instructor. Lecs, M W F 11:15. Evening prelins: Sept. 26 and Nov. 2. E. R. Loew and staff.

A general course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of living organisms from the cellular to the organismal level. Structure/function relationships are stressed along with underlying physico-chemical mechanisms.
BIOAP 312 Farm Animal Behavior (also Animal Science 305)  
Spring. 2 credits. Prerequisites: an introductory course in animal physiology. Recommended: at least one animal production course or equivalent experience. S-U grades optional. Lecs, T R 11:15. E. A. Oltenacu, K. A. Houpt. The behavior of production species (avian and mammalian) influences the success of any management program. Students study behaviors relating to feeding, reproduction, and social interactions of domestic animals, and their physiological basis. Management systems for combating overcrowding and their implications for animal behavior and welfare are stressed.

BIOAP 313 Histology: The Biology of the Tissues  
Fall. 4 credits. Prerequisite: one year of introductory biology. Recommended. BIOBM 330 or 331, or their equivalents; and organic chemistry. Lecs, T R 11:25; labs, T R 2:30–5:00. Staff. Provides students with a basis for understanding the microscopic and functional organization of vertebrates, as well as methods of analytic morphology at the cell and tissue levels. Dynamic interrelations of structure, composition, and function in cells and tissues are emphasized. The course may include work with invertebrate or vertebrate animals.

BIOAP 316 Cellular Physiology  
Spring. 4 credits. Limited to 100 students, with preference given to students studying in animal physiology. Each lab limited to 24 students. Prerequisite: concurrent or previous enrollment in BIOBM 330 or 331 and 332 or 333. Lecs, M W F 9:05; lab, M T W Th 1:25–5:00 (lab may be added if enrollment exceeds 72 students). Evening prelms: Feb. 27, Apr. 4, and April 30. A. Quaroni and staff. Lectures introduce students to the most current information on the way cells function and regulate themselves and neighboring cells and on what molecules are involved in these regulatory processes. Laboratories provide an introduction to cell and organ culture and to immunological techniques used to study cell structure and function in vivo and in vitro. Experiments performed in the laboratory are closely related to, and provide practical experience with, subjects covered in the lectures. Vertebrate animals are used in this course. No experimentation is performed on live animals.

BIOAP 319 Animal Physiology Experimentation  
Fall. 4 credits. Designed for upper-level undergraduate and graduate students studying animal physiology and other students interested in biomedically related professions. Graduate students in the Field of Physiology and related fields without equivalent background are strongly encouraged to enroll. Each of 4 afternoon laboratory sections limited to 30 students. Prerequisite: concurrent or previous enrollment in BIOAP 311 or permission of instructor based on previous mentorship. Students must choose to succeed in their introductory animal physiology course. Lab, F 12:20; lab, M T W R 12:20–5:00 (includes disc section). R. A. Corradino. A series of student-conducted in vivo and in vitro experiments designed to illustrate basic physiological processes in animals and to introduce students to animal physiology research techniques, instrumentation, experimental design, and interpretation of results. Techniques include anesthesia, dissection, tissue section under anesthesia, physiographic and computer recording and analysis. Experiments with living tissues and live animals examine properties of blood, muscle, and nerves; cardiovascular, respiratory, and renal function and their control, and endocrine regulation of renal, cardiovascular, and reproductive tissue activity. Experimental resources include live animals of several vertebrate species, including frogs, rats, and rabbits, which are euthanized in conjunction with the laboratory experiments. Written reports of laboratory activities are required. Grading is based on evaluation of these reports, quizzes, and laboratory performance.

BIOAP 419 Advanced Animal Physiology Experimentation  
Spring. 3 credits. Prerequisite: BIOAP 319 or equivalent. Students not meeting this prerequisite must obtain written permission of instructor in T 9 026 Vet Research Tower before the first class. Lecs, M W F 10:10–11:10. Evening prelms: Feb. 20, Mar. 26, and Apr. 23. K. W. Beyenbach and staff. The course offers an in-depth treatment of selected topics in mammalian and human physiology. Emphasis is on concepts and a working knowledge of physiology. Selected topics include: basic functional elements of biological systems; recurrent themes in physiology: design of multicellular animals; mammalian fluid compartments; homeostasis; membrane and epithelial transport; electrophysiology; cardiovascular physiology; gastrointestinal physiology; renal physiology; and acid/base physiology. The lectures incorporate clinical correlations whenever appropriate. Occasional guest lectures talk about work and careers in basic research and/or clinical medicine. Recommended for biological sciences majors, pre-med and pre-clinical medicine. Recommended for veterinary students, and beginning graduate students in physiology, nutrition, and animal science.

BIOAP 458 Mammalian Physiology  
Spring. 3 credits. Enrollment limited. Graduate student auditors allowed. Prerequisite: BIOAP 311 or equivalent. Students not meeting this prerequisite must obtain written permission of instructor in T 9 026 Vet Research Tower before the first class. Lecs, M W F 10:10–11:10. Evening prelms: Feb. 20, Mar. 26, and Apr. 23. K. W. Beyenbach and staff. The course offers an in-depth treatment of selected topics in mammalian and human physiology. Emphasis is on concepts and a working knowledge of physiology. Selected topics include: basic functional elements of biological systems; recurrent themes in physiology: design of multicellular animals; mammalian fluid compartments; homeostasis; membrane and epithelial transport; electrophysiology; cardiovascular physiology; gastrointestinal physiology; renal physiology; and acid/base physiology. The lectures incorporate clinical correlations whenever appropriate. Occasional guest lectures talk about work and careers in basic research and/or clinical medicine. Recommended for biological sciences majors, pre-med and pre-clinical medicine. Recommended for veterinary students, and beginning graduate students in physiology, nutrition, and animal science.

BIOAP 615 Nutrition, Physiology, and Biochemistry of Mineral Elements  
Fall or spring. 2 credits. Prerequisite: concurrent or previous enrollment in BIOAP 319, Animal Physiology Experimentation. Prerequisite: BIOAP 311 or equivalent. Students not meeting this prerequisite must obtain written permission of instructor in T 9 026 Vet Research Tower before the first class. Lecs, M W F 10:10–11:10. Evening prelms: Feb. 20, Mar. 26, and Apr. 23. K. W. Beyenbach and staff. The course offers an in-depth treatment of selected topics in mammalian and human physiology. Emphasis is on concepts and a working knowledge of physiology. Selected topics include: basic functional elements of biological systems; recurrent themes in physiology: design of multicellular animals; mammalian fluid compartments; homeostasis; membrane and epithelial transport; electrophysiology; cardiovascular physiology; gastrointestinal physiology; renal physiology; and acid/base physiology. The lectures incorporate clinical correlations whenever appropriate. Occasional guest lectures talk about work and careers in basic research and/or clinical medicine. Recommended for biological sciences majors, pre-med and pre-clinical medicine. Recommended for veterinary students, and beginning graduate students in physiology, nutrition, and animal science.

BIOAP 658 Molecular Mechanisms of Hormone Action  
Fall or spring. 1 or 2 credits for each topic. May be repeated for credit. Enrollment in each topic may be limited. S-U grades optional, with permission of instructor. Lectures, laboratories, discussions, and seminars on specialized topics. Five topics offered fall 1995; three topics offered spring 1996.

BIOAP 711 The Physiological Control Systems That Control Ingestive Behavior: Food and Water Intake  
Fall. 1 credit. Offered alternate years. Lec, 1 hour each week to be arranged. K. A. Houpt. A variety of species are considered with emphasis on common mammalian species: rat, dog, goat, pig, horse, and human. A mixed lecture/seminar format is used.

BIOAP 712 Plasma Lipoprotein  
Spring. 1 credit. Offered alternate years. Lec, 1 hour each week to be arranged. A. Bensadoun.

BIOAP 713 Thermoregulation and Exercise  
Fall. 1 credit. Offered alternate years. Lec, 1 hour each week to be arranged. D. Robertshaw. An examination of the competing demands on the body of exercise and heat exposure with particular emphasis on the cardiopulmonary system and integration of thermoregulatory reflexes.

BIOAP 714 Membrane and Epithelial Transport  
Fall. 1 credit. Offered alternate years. Lec, 1 hour each week to be arranged. K. W. Beyenbach. The course begins with a series of lectures on the structure and function of membrane pumps, carriers, and channels. Thereafter, the students read and discuss recent review articles on these subjects. When appropriate, there are laboratory demonstrations to illustrate how some of these transport systems are studied experimentally.

BIOAP 715 Acid-Base Relations  
Fall or spring. 2 credits. Autotutorial. A. Dobson.

BIOAP 717 Structure and Function of Joints with Emphasis on Arthritis  
Fall. 1 credit. Open to undergraduates and graduate students. Offered alternate years. Lec, R 3:00. G. Lust.
BIOAP 718 Evolution of Color
Spring. 1 credit. Offered alternate years. Lec, 1 hour each week to be arranged. E. R. Loew.

BIOAP 719 Graduate Research in Animal Physiology (also Veterinary Physiology 628)
Fall or spring.Variable credit. Prerequisites: written permission of the section chair and of the staff member who supervises the work and assigns the grade. Students must register in Vet Research Tower 825. S-U grades optional. Hours to be arranged. Staff. Similar to BIO G 499 but intended for graduate students who are working with faculty members on an individual basis.

BIOAP 757 Current Concepts in Reproductive Biology
Fall. 3 credits. Limited to 20 students. Prerequisites: graduate student degree in biology and a strong interest in reproductive biology. S-U grades optional. Offered alternate years. Lec, 2 hours each week to be arranged; disc, 1 hour each week to be arranged. J. E. Fortune, W. R. Butler, and staff.

A team-taught survey course in reproductive physiology/endocrinology. Lectures by a number of reproductive biologists on various aspects of male and female reproduction. Endocrinology: function (endocrine regulation, tests function, spermatogenesis, and sperm physiology/function); female reproductive function (endocrinology, ovarian development and functions, oocyte physiology/function); fertilization and early embryo development, pregnancy, parturition; puberty, and reproductive technology. Student participation in the form of discussions and/or presentations.

BIOAP 811 Advanced Physiological Methods I
Fall. 2 credits. Enrollment limited. Prerequisites: graduate student status or permission of course coordinator.

This is a course primarily for graduate students in physiology and related disciplines. Experiments are carried out in the laboratories of physiology faculty members to acquaint graduate students with the latest techniques/methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

BIOAP 812 Advanced Physiological Methods II
Spring. 2 credits. Enrollment limited. Prerequisites: graduate student status or permission of course coordinator.

This is a course primarily for graduate students in physiology and related disciplines. Experiments are carried out in the laboratories of physiology faculty members to acquaint graduate students with the latest techniques/methods in physiological research. Three modules are offered each semester by arrangement with the course coordinator.

Related Courses in Other Departments
Adaptations of Marine Organisms (Biological Sciences [BIOSM] 413)
Advanced Work in Animal Parasitology (Veterinary Microbiology 737)
Animal Development (Veterinary Anatomy 507)
Animal Reproduction and Development (Animal Science 300)
Developmental Biology (Biological Sciences [BIOGD] 385)
Embryology (Biological Sciences [BIOGD] 389)
Fundamentals of Endocrinology (Animal Science 427)
Insect Morphology (Entomology 322)
Integration and Coordination of Energy Metabolism (Biological Sciences [BIOBM] 637 and Nutritional Sciences 636)
Neuropathology (Veterinary Anatomy 504)
Sensory Function (Biological Sciences [BIONB] 489)
Teaching Experience (Biological Sciences [BIO G] 498)
Undergraduate Research in Biology (Biological Sciences [BIO G] 499)

BIOCHEMISTRY, MOLECULAR AND CELL BIOLOGY (BIOBM)

BIOBM 132 Orientation Lectures in Biochemistry
Spring, weeks 1–3. No credit. Primarily for freshmen, sophomores, and transfer students. S-U grades only. Lab to be arranged. S-U grades optional. Staff.

BIOBM 231 General Biochemistry
Fall. 3 credits. Intended for students who have not studied biochemistry previously and who do not expect to pursue it further. Not recommended for students who have taken organic chemistry. Prerequisites: CHEM 104 or 208 or equivalent. Prerequisites required (306 B Rice Hall). S-U grades optional. Lees, 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.

BIOBM 232 Recombinant DNA Technology and Its Applications (also Biology and Society 232)
Spring. 3 credits. S-U grades optional. Limited to freshmen with AP 4 or 5 in biology. Possible fee for course material. Lecs and disc, M W F 11:15. J. M. Calvo. An introduction to molecular approaches to biology. Basic concepts underlying recombinant DNA technology together with strategies for cloning genes are discussed. Much of the course deals with applications of recombinant DNA technology to basic research and to biotechnology. Applications to be discussed include screening for genetic diseases, animal and plant improvement, and production of proteins useful in medicine, agriculture, and industry. Some of the applications of this technology to society are presented and discussed. Recommended especially for students desiring a firm background in recombinant DNA technology in preparation for taking genetics and biochemistry.

BIOBM 234 Recombinant DNA Applications, Discussion
Spring. 1 credit. Concurrent registration in BIOBM 232 required. Limited to 16 students in each section. S-U grades optional. Disc, F 10:10 or 12:20.

J. M. Fessenden MacDonald.

Applications discussed include screening for genetic diseases, HIV and other maladies; gene therapies; DNA fingerprinting; agricultural uses—animals, plants, and food products; and drugs, diagnostics, and vaccines. Social, ethical, legal, and economic issues are discussed as well as new linkages between agriculture and medicine.

BIOBM 330–332 Principles of Biochemistry

Introductory biochemistry is offered in two formats: individualized instruction (330) and lectures (331 and 332). Individualized instruction is offered to a maximum of approximately 200 students each semester. Lectures given fall semester (331) and spring semester (332).

BIOBM 330 Principles of Biochemistry, Individualized Instruction
Fall or spring. 4 or 5 credits (5-credit option includes 4 additional paper discussion sections and 4 computer-aided macromolecular visualization activities). Prerequisites: one year of introductory biology for majors and CHEM 253 or 358 or equivalent, or permission of instructor. May not be taken for credit after BIOBM 331, 332, or 335. S-U grade optional for graduate students only. Hours to be arranged. Evening prelims: Fall; Oct. 24; Spring; Mar. 12. J. B. Blankenship, G. S. Albrecht, P. C. Hinkle, R. Wu, and staff.

Fourteen units that cover protein structure and function, enzymes, basic metabolic pathways, DNA, RNA, protein synthesis, and an introduction to gene cloning. No formal lectures, autotutorial format. The four-credit option includes discussions on three research papers on protein structure and function. The five-credit option includes four additional research papers on molecular biology and four other activities that include use of a silicon-graphics workstation, discussion of review articles, or discussion of other research papers.

BIOBM 331 Principles of Biochemistry: Proteins and Metabolism
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and CHEM 253 or 358 or equivalent, or permission of instructor. May not be taken for credit after BIOBM 330 or 333. S-U grades with permission of instructor. Lecs, M W F 10:10. Evening prelim: Oct. 19. G. W. Feigenson.

The chemical reactions important to biology, and the enzymes that catalyze these reactions, are discussed in an integrated format. Topics include methods for studying proteins, protein folding, enzyme catalysis, bioenergetics, and key reactions of synthesis and catabolism.

BIOBM 332 Principles of Biochemistry: Molecular Biology
Spring. 2 credits. Prerequisites: one year of introductory biology for majors and one semester of organic chemistry, or permission of instructor. May not be taken
for credit after BIOBM 330 or 333.
S-U grades optional, with permission of instructor. Lecs, T, R 12:20. T. C. Huffaker.
A comprehensive course in molecular biology that covers the structure and properties of DNA, RNA, and proteins, the regulation of gene expression, and the synthesis and processing of RNA and proteins.

**BIOBM 333 Principles of Biochemistry, Lecture**

Summer (6-week session). 4 credits.
Prerequisite: CHEM 253 or 358 or equivalent. Lecs. M-F 9-11:00. J. M. Griffiths.
The chemistry of biological substances and their transformations in living organisms. The major areas of biochemistry are covered comprehensively. For advanced undergraduates and graduate students; a prerequisite for the laboratory. A laboratory course designed to introduce students to the biochemical techniques commonly used in the study of biological materials. Various assay methods, chromatography, electrophoresis, and use of the scintillation counter are taught. Students work in small groups and rotate through three modules. An enzymology module teaches methods used in protein isolation, purification, the study of enzyme kinetics and of enzyme characterization. In the nucleic acids module, students are introduced to recombinant DNA methodology and isolating and studying some of the prophages and DNA. In the fall, the third module is a study of lipids. Students isolate and purify lipids from a source of individual choice, quantify the material for lipid content and degree of fatty acid saturation, identify the various lipids by thin layer chromatography, and analyze for phosphate and cholesterol content. During the spring term, the third module introduces students to techniques used in the clinical laboratory. Methods used in blood and urine analyses are applied to the students' own samples; some nutritional assays are done for protein and vitamin content of foods.

**BIOBM 430 Basic Biochemical Methods**

Fall or spring. 4 credits. Enrollment limited. Prerequisites: either BIOBM 330 or 333 or 332 and concurrent enrollment in 331, organic chemistry lectures and laboratories, and permission of instructor obtained by preregistering in Rice 306 B. Concurrent registration in BIOBM 330 or 331 may be arranged in the fall term for graduate students. Lec and disc. F 1:25; labs. M, W or T 12-20-4:25. M. M. Griffiths and staff.
A laboratory course designed to introduce students to the biochemical techniques commonly used in the study of biological materials. Various assay methods, chromatography, electrophoresis, and use of the scintillation counter are taught. Students work in small groups and rotate through three modules. An enzymology module teaches methods used in protein isolation, purification, the study of enzyme kinetics and of enzyme characterization. In the nucleic acids module, students are introduced to recombinant DNA methodology and isolating and studying some of the prophages and DNA. In the fall, the third module is a study of lipids. Students isolate and purify lipids from a source of individual choice, quantify the material for lipid content and degree of fatty acid saturation, identify the various lipids by thin layer chromatography, and analyze for phosphate and cholesterol content. During the spring term, the third module introduces students to techniques used in the clinical laboratory. Methods used in blood and urine analyses are applied to the students' own samples; some nutritional assays are done for protein and vitamin content of foods.

**BIOBM 432 Survey of Cell Biology**

Spring. 3 credits. Prerequisite: BIOBM 330 or 333 or 331 and 332 or equivalent. S-U grades optional for graduate students only. Lecs. M-W 8-10-9:50. W. J. Brown and staff.
A survey of a wide array of topics focusing on the general properties of eucaryotic cells. The topics include methods used for studying cells, the structure and function of the major cellular organelles, and analyses of cellular processes such as mitosis, endocytosis, cell motility, secretion, cell-to-cell communication, gene expression, and oncogenesis. Some of the material is covered in greater depth in BIOBM 437, BIOGD 483, BIOBM 632, 636, and 639.

**BIOBM 435-436 Undergraduate Biochemistry Seminar**

435: fall; 436: spring. 1 credit each term. May be repeated for credit. Limited to undergraduates: BIOBM 330 or 333 or 331 and 332 or written permission of instructor. S-U grades only. Sem to be arranged. Organizational meeting first W of each semester at 4 p.m. Fall: G. P. Hess and staff.
Selected papers from the literature on a given topic are evaluated critically during six or seven two-hour meetings.

**BIOBM 437 Oncogenes and Cancer Viruses (also Toxicology 437)**

Fall. 3 or 4 credits (4 credits for participation in the writing component of the course). Undergraduates are required to do the 4-credit option. Prerequisite: BIOBM 330 or 333 or 331 and 332. Recommended: BIOGD 281. S-U grades optional. Lecs, T, R 12:20-1:35; disc, W 7:30 p.m. D. L. Shalloway.
The use of animal cells in culture as an experimental system for studying the cellular mechanisms involved in carcinogenesis through the use of recombinant DNA and biochemical methods. Topics include immortalization of cells in culture, the cell cycle, differences between normal and neoplastically transformed cells, growth factors, molecular biology and biochemistry of cancer viruses, structure and function of viral and cellular oncogenes. Understanding of relevant experimental techniques, experimental design, and comprehension of primary research literature is emphasized. This is not a survey course; it is designed primarily for students planning a career in research. A series of exercises to develop scientific writing skills are required for undergraduate students except by special permission. Depending on availability, graduate students may also participate in this writing component. Four credits are given when the writing component is included.

**BIOBM 438 Yeast Genetics and Molecular Biology**

Spring. 2 credits. Prerequisites: BIOGD 281 and BIOBM 330 or 332 or 333, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1995-96. Lect. W 8-9:55 p.m. B. K. Tyt.
An advanced overview of genetic studies in yeast, primarily Saccharomyces cerevisiae. Special attention is given to the use of yeast as a model for studying problems in cell biology in eukaryotes. Both genetic and molecular approaches to selected problems of biological interest are discussed.

**BIOBM 630 Experimental Cell Biology**

Fall or spring. 2 credits. Prerequisites: BIOBM 330, or 331 and previous or concurrent enrollment in 332, or 333; concurrent enrollment in BIOBM 630 or 638; and permission of instructor, obtained by filling out an enrollment form (available in 107 Biotechnology and 301C Rice Hall). Class assignments are affected by the date these enrollment forms are returned. Preference given to undergraduate biology majors in the Biochemistry or Cell Biology Programs of Study, and to graduate students with a minor in the Field of Biochemistry, Molecular and Cell Biology. Labs. Fall: T 9:05-4:25 (seven weeks); spring: M W 1:25-4:25 or R 9:05-4:25 (seven weeks); disc, fall or spring: 1 hour each week for seven weeks to be arranged. V. M. Vogt.
Experiments include purification of two enzymes by ion exchange chromatography or by affinity chromatography, determination of kinetic parameters for one enzyme, analysis by rate zonal sedimentation, SDS-polyacrylamide gel electrophoresis, and immunoblotting.
Lectures on topics of eucaryotic gene organization, regulation of gene expression, RNA processing, chromatin structure, the structure and movement of chromosomes, and the architecture of the nucleus. This course covers the structure and function of the nucleus at the molecular and cell biological levels, and together with BIOBM 632 and 636, provides broad coverage of the cell biology subject area.

**BIOBM 648 Plant Biochemistry (BIOP 648)**

Spring. 3 credits. Prerequisites: BIOBM 330 or 333 or 331 and 332, organic chemistry, and a course in plant physiology. Offered alternate years. Not offered 1995-96. Lecs, M W F 9:05. A. T. Jagendorf and staff.

Selected areas of plant biochemistry are reviewed in the context of the plant life cycle and responses to the environment. Topics include metabolism of lipids, carbohydrates, organic acids, and proteins; nitrogen and sulfur assimilation; photosynthesis; development and replication of chloroplasts; and cell-wall composition and properties. Attention is paid to operation of control mechanisms.

**BIOBM 692 Protein-Nucleic Acid Interactions (BIOMI 692)**

Spring. 3 credits. Prerequisites: BIOBM 330 or 333 or 331 and 332 and 336. Lecs, T R 10:10-11:25. J. D. Helmann. The physical and chemical bases of protein-nucleic acid interactions are explored including both theory and specific examples. Proteins considered include: bacterial non-specific and sequence specific DNA and RNA binding proteins, nucleic acid polymerases, recombinases, topoisomerases, DNA repair enzymes, and nucleases.

**BIOBM 732-737 Current Topics in Biochemistry**

Fall or spring. 1 credit each term. May be repeated for credit. Required of, and registration limited to graduate students majoring in biochemistry. S-U grades optional. Labs and discs, 12 hours each week to be arranged. Organizational meeting first R of semester, 10:10 a.m. B. M. Tyler and staff. This course emphasizes experimental design and the concepts implicit in current approaches to research in biochemistry and cell biology. Students are required to read papers and participate actively in discussions in order to design their own protocols before performing experiments using the techniques most common in the recent literature of these fields.

**BIOBM 833 Research Seminar in Biochemistry**

Fall or spring. 1 credit each term. May be repeated for credit. Required of, and registration limited to graduate students majoring in biochemistry. S-U grades optional. Lab to be arranged. Staff (Coordinator: G. W. Feigenson, graduate faculty representative).

Research in the laboratories of two or three different professors chosen by the student. Arrangements are made jointly between the graduate field representative and the research adviser.
Field exercises designed to give students direct experience with field work, with emphasis on developing observational skills, journal keeping, and a landscape perspective. Topics include plant succession, niche, relationships of insects, influence of herbivores and competition on plant performance, decomposition of soil litter, sampling plankton, and use of scientific collections.

**BIOES 264 Birds in Biology, Lectures**

Spring. 2 credits. May not be taken for credit after BIOES 475. Intended for students who have not taken ENBI 264. S-U grades optional. Lecs, M W 9:05. A. D. Boddington.

Using birds as a starting point, this course aims at bringing exciting new insights in bird biology to non-majors. Bird research has often generated new insights in the biological sciences. Starting from studies on birds a number of topics from a variety of biological disciplines can be addressed. These include problems from behavioral ecology (mating systems, sperm competition, extra-pair paternity, territorial behavior, song), from population ecology (population dynamics, micro-evolution, competition), from evolutionary biology (genetic history theory, optimal clutch size) and from conservation biology (biodiversity, habitat fragmentation, inbreeding).

**BIOES 265 Birds in Biology, Laboratory**

Spring. 1 credit. Limited to 40 students. Intended for students with no background in biology. Prerequisite: concurrent enrollment in BIOES 264. S-U grades optional. Lab, S 9:05-12:05, some all-day field trips to be arranged. Carpooling to the Vertebrate Collections at Research Park is necessary several times during the semester. A. D. Boddington. Laboratories supplement the lecture course and provide hands-on experience. Laboratories include field trips, some field research experience, and work in the Cornell bird collections.

**BIOES 266 Functional Ecology of Vertebrates**

Fall. 4 credits. Enrollment limited to 60 students. Prerequisite: one laboratory section from BIOES 264. S-U grades optional. Lecs, M W F 11:15; disc, M T W R or F 2-4:25. Evening prelims: Feb. 22 and Apr. 2. C. H. Green, W. M. White.

A survey of the physics, chemistry, geology, and biology of the oceans for both science and non-science majors. Topics include seafloor spreading and plate tectonics; marine sedimentation, chemistry of seawater; ocean currents and circulation; plankton, and use of scientific collections. Bird research has often generated new insights in the biological sciences. Starting from studies on birds a number of topics from a variety of biological disciplines can be addressed. These include problems from behavioral ecology (mating systems, sperm competition, extra-pair paternity, territorial behavior, song), from population ecology (population dynamics, micro-evolution, competition), from evolutionary biology (genetic history theory, optimal clutch size) and from conservation biology (biodiversity, habitat fragmentation, inbreeding).

**BIOES 267 Morphology of Vertebrates**

Fall. 3 credits. Prerequisite: concurrent or previous enrollment in BIOES 266. Lecs, M W F 12:20; labs, M T or W 12:5-4:25. Evening prelims to be announced. Fee, $15. J. B. Heiser.

An introductory course for students interested in organismal biology. The features of the physical environment that are important to insects and vertebrates are illustrated to demonstrate the role of the environment in determining the type of organisms present. Topics covered include the interaction of physiological, behavioral, and morphological characteristics in organismal adaptation, morphological variability, and population ecology. Laboratories include a survey of the diversity of endothermic and ectothermic animals, ecophysiological measurements, and paleontological and morphological measurements of important environmental parameters in local habitats. The course uses live and preserved vertebrate animals for field observations and laboratory exercises.

**BIOES 267 Functional and Comparative Morphology of Vertebrates**


An exploration of the relations between form and function in biological systems with an emphasis on trends in vertebrate evolution. Lectures integrate data from topics such as locomotion, feeding, size, and scaling with issues of historical importance and current interest (e.g., correlation of body parts, adaptationist explanations, developmental constraints, criteria for determining biogenetic phenomena, and efficiency). Laboratories include dissections of preserved vertebrate animals and noninvasive live animal demonstrations (motion analysis, surface electrode, and force-plate recordings).

**BIOES 275 Human Biology and Evolution**

Fall. 3 credits. S-U grades optional, with permission of either instructor. Offered alternate years. Lecs, M W F 10:10, disc, M 10:10. K. A. R. Kennedy, J. D. Haas.

An introduction to the biology of Homo sapiens through an examination of human evolution, biological diversity, and modes of adaptation to past and present environments. Evolutionary theory is reviewed in relation to the current evidence from the fossil record and studies of the evolution of human behavior. A survey of human adaptation covers a complex of biological and behavioral responses to environmental stress. Human diversity is examined as the product of long-term evolutionary forces and short-term adaptive responses. Topics such as creationism, the Piltdown fraud, the sociobiology debate, genetic engineering, race and IQ, and racism are presented as examples of current issues in human biology.

**BIOES 276 Evolutionary Biology**

Fall or spring. 3 or 4 credits. (4-credit option involves writing component and two discussion sections per week; limited to 20 students each semester. Students may not preregister for the 4-credit option, except interested students complete an application form on the first day of class.) Limited to 300 students; not open to freshmen. Prerequisite: one year of introductory biology or permission of instructor. S-U grades optional. Lecs, T R 9:05; disc, 1 hour each week to be arranged. Evening prelims: Fall, Oct. 5 and Nov. 9; spring, Feb. 27 and Apr. 2. F. A. George. Fall, S. Via.

The course explores patterns of diversity and for the apparent "good fit" of organisms to the environment. Topics covered include the genetic and development basis of evolutionary change, processes at the population level, the theory of evolution by natural selection, levels of selection, concepts of fitness and adaptation, modes of speciation, long-term trends in evolution, rates of evolution, and extinction. Students taking the 4-credit option read additional materials from the primary literature and write a series of essays in place of the regular prelims.

**BIOES 277 Human Paleontology**

Fall. 4 credits. Prerequisite: one year of introductory biology or ANTH 101 or permission of instructor. Offered alternate years. Not offered 1995-96; next offered fall 1997. 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
Topics include significance of plant chemistry and study of exemplars.

An introduction to the biology and evolution of the major invertebrate phyla, concentrating on marine representatives. In addition to the evolution of form and function, lectures cover aspects of ecology, behavior, physiology, chemical ecology, and natural history of invertebrates. The Shoals field trip is an excellent opportunity to study representatives of most of the major phyla in their natural habitat. Laboratory demonstrations on campus involve live marine and freshwater invertebrates.

**BIOES 452 Herbivores and Plants: Chemical Ecology and Coevolution (also Entomology 452)**

Spring, 3 credits. Prerequisites: one year of introductory biology, BIOES 261, CHEM 253 or 255 or 251 or 250, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1995–96. Lecs, M W F 11:15. Field trips, additional lectures, or laboratory demonstrations may be held in place of F lec. P. P. Feeny.

Topics include significance of plant chemistry in mediating interactions between plants and herbivorous animals; mechanisms and strategies of plant finding and exploitation by animals, especially insects, and of defense and escape by plants; evolutionary hypotheses for ecological patterns of resistance and attack; and implications for human food and agriculture.

**BIOES 455 Insect Ecology (also Entomology 455)**

Fall, 4 credits. Prerequisites: BIOES 261 or equivalent and ENTOM 212 or knowledge of another taxon. Offered alternate years. Lecs, M W F 11:15.

R. B. Root.

Topics include the nature and consequences of biotic diversity, biogeography, coevolution, adaptive syndromes exhibited by various guilds, population regulation, impact of insects on ecosystems, comparative and functional analysis of communities, and differences in the organization of natural and managed systems. Ecological and evolutionary principles are integrated by thorough study of exemplars.

**BIOES 456 Stream Ecology (also Entomology 456)**


Lecture addresses the patterns and processes occurring in stream ecosystems, including channel formation; water chemistry; watershed influences; plant, invertebrate, and fish community structure; nutrient cycling; trophic dynamics; colonization and succession; community dynamics; conservation, and the impacts of disturbance. Lab: A field project includes descriptive and experimental techniques and hypotheses testing related environmental assessment.

**BIOES 457 Limnology: Ecology of Lakes, Lectures**

Fall, 3 credits. Prerequisite: BIOES 261 or permission of instructor. Recommended: introductory chemistry. Offered alternate years. Not offered 1995–96. Lecs, M W F 11:15. N. G. Hairston, Jr. The study of continental waters, with emphasis on lakes and ponds. Factors regulating nutrient cycling processes, population and community dynamics of freshwater organisms, and physical and chemical properties of fresh water are considered.

**BIOES 459 Limnology: Ecology of Lakes, Laboratory**

Fall, 2 credits. Prerequisite: concurrent or previous enrollment in BIOES 457. Offered alternate years. Not offered 1995–96. Lab, T W R 1:25–4:25; 1 weekend field trip. Fee. $10. N. G. Hairston, Jr. and staff.

Laboratories and field trips devoted to studies of the biological, chemical, and physical properties of lakes and other freshwater environments. Vertebrate dissection (fish) during one of each is optional, and during a portion of weekend field trip.

**BIOES 461 Population and Evolutionary Ecology**


Problems of ecology are viewed from an evolutionary perspective, exploring issues of adaptation and fitness definition by developing advanced understanding of demography and interspecific interactions. Blending theory and empirical findings, the course explores population dynamics, life-history theory, dispersal; competition, predation, parasite-host coevolution, mutualisms, and sexual, kin, and group selection. Methods of estimation and analysis are learned in laboratory.

**BIOES 462 Marine Ecology**


C. D. Harvell.

Lectures and discussion focus on current research in broad areas of marine ecology with an emphasis on processes unique to marine systems. A synthetic treatment of multiple levels of organization in marine systems including organismal, population, community, ecosystems, and evolutionary biology.

**BIOES 463 Plant Ecology and Population Biology, Lectures**

Fall, 3 credits. Prerequisites: BIOES 261 or 278 or equivalent, and permission of instructor. Recommended: some taxonomic familiarity with vascular plants and concurrent enrollment in BIOES 465. Offered alternate years. Not offered 1995–96. Lecs, M W F 11:15. M. A. Geber, P. L. Marks.

This course examines the biological and historical factors affecting the structure of plant communities and the distribution, abundance, and population dynamics of individual species. The influence of the environment, disturbance history, competition, and herbivory on the organization of plant communities is considered first. Plant populations are then studied through an analysis of plant life histories and plant-plant and plant-animal interactions. Throughout the course an attempt is made to blend empirical patterns, experimental results, and theory. Readings are drawn from the primary literature.

**BIOES 464 Macroevolution**

Spring, 4 credits. Limited to 25 students. Prerequisite: BIOES 278 or permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Lecs, T R 10:10–11:30; disc, 1 hour each week to be arranged. A. R. McElwain.

An advanced course in evolutionary biology centered on large-scale features of evolution. Areas of emphasis include patterns and processes of speciation, phylogeny reconstruction, the origins and direction of processes of major evolutionary transitions, and patterns of diversification and experimentation in the fossil record. Discussion of these problems involve data and approaches from genetics, morphology, systematics, paleoecology, development, and ecology.

**BIOES 465 Plant Ecology and Population Biology, Laboratory**


Laboratory and field exercises designed to give firsthand experience with the ecology and population biology of plants. Emphasis is on making observations and measurements of plants in the field and greenhouse, and on simple data analysis.

**BIOES 466 Physiological Plant Ecology, Lectures**

Spring, 3 credits. Limited to 35 students. Prerequisite: BIOES 261 or introductory plant physiology. S-U grades optional, with permission of instructor. Offered alternate years. Lecs, T R 10:10–11:25.

T. E. Dawson.

A detailed survey of the physiological approaches used to understand the relationships between plants and their environment. Lectures explore physiological adaptation; limiting factors; resource acquisition and allocation; photosynthesis, carbon, and energy balance; water use and water relations; nutrient relations; linking physiology, development, and morphology; stress physiology, life history and physiology, the evolution of physiological performance; and physiology at the population and community and ecosystem levels. Readings draw from the primary literature and textbooks.

**BIOES 468 Physiological Plant Ecology, Laboratory**

Spring, 2 credits. Limited to 15 students. Prerequisite: previous or concurrent enrollment in BIOES 466. Offered alternate years. Lab, T 1:25–4:25, plus additional lab hours to be arranged. T. E. Dawson.

A detailed survey of the physiological approaches used in understanding the relationships between plants and their environment. Laboratories apply physiological techniques to specific ecological problems.
and cover aspects of experimental design and computer-aided data analysis. Most laboratories run past the three-hour period, with students spending an average of 3 hours/week in additional lab time for this course.

**BIOES 470 Ecological Genetics (also Entomology 470)**  
Spring. 4 credits. Prerequisite: BIOES 278 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1995–96. Lecs, T R 10:10–11:30; disc, 1 hour each week to be arranged. S. Via.  
A study of the relationships between genetic and ecological processes in populations. Topics include consequences of genetic variation in age-structured populations; demographic concepts of fitness; evaluation of methods for measuring genetic variation and ecology, and natural history of mammals in the wild, with primary emphasis on the North American fauna. Systematics laboratories held in the museum at Research Park. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive demonstrations or experiments. The systematics laboratory exercises are based on museum specimens.

**BIOES 471 Mammalogy**  
Spring. 4 credits. Recommended: BIOES 274. S-U grades optional, with permission of instructor. Offered alternate years; next offered fall 1997. Lecs, M W F 12:20; lab, M T or W 1:25–4:25; 1 weekend field trip required. Carpooling to the Vertebrate Collections at Research Park is necessary several times during the semester. Fee, $15. D. K. McClure.  
Lectures on the evolution, classification, distribution, and adaptations of mammals. Laboratory and fieldwork on systematic, ecological, and natural history of mammals of the world, with emphasis on the North American fauna. Systematic laboratories held in the museum at Research Park. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive demonstrations or experiments. The systematics laboratory exercises are based on museum specimens.

**BIOES 472 Herpetology**  
Lectures cover various aspects of the biology of amphibians and reptiles, including evolution, zoogeography, ecology, behavior, and physiology. Laboratory includes systematic, functional morphology, and behavior. Live animals are studied in the field and are used in the laboratory for nondestructive demonstrations and experiments. The systematics laboratory exercises are based on museum specimens and dissection of preserved materials.

**BIOES 473 Ecology of Agricultural Systems (also Soil, Crop, and Environmental Sciences 473)**  
Fall. 3 credits. Limited to 45 students. Prerequisite: BIOES 261 or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1995–96. Lecs and disc, T R 2:30–4:35. During the first 6 weeks of class, the Thursday meetings may run to 5:00 because of field trips. A. G. Power and staff.  
Analysis of the ecological processes operating in agricultural systems, with an emphasis on the interactions between organisms. Topics include nutrient and carbon cycles, agroecosystems, plant competition and facilitation, intercropping, the ecology of species invasions, mutualism in agroecosystems, plant-herbivore relations, plant-pathogen interactions, and perspectives for integrated management of agricultural systems in the United States. Case studies from both the tropics and the temperate zone are used to illustrate important concepts.

**BIOES 474 Laboratory and Field Methods in Human Biology (also Anthropology 474)**  
Spring. 5 credits. Limited to 16 students with permission of instructor obtained by preregistering in E231 Conron. Prerequisite: one year of introductory biology or ANTHR 101 or permission of instructor. Offered alternate years. Not offered 1995–96. Lecs, T R 10:10–12:05; additional hours to be arranged. Independent research project required. K. A. Kennedy.  
Practical exercises and demonstrations of modern approaches to the methodology of physical anthropology. Emphasis on comparative human anatomy, osteology, description of skeletal and living subjects, paleopathology, skeletal maturation, and relevant field techniques for the archaeologist and forensic anthropologist. There is a discussion of a prosed (dead) nonhuman primate, usually a macaque or baboon. Students attend demonstrations of the dissection performed by the prosector (a hired graduate student).

**BIOES 475 Ornithology**  
Fall. 4 credits. Limited to 30 students, with permission of instructor obtained by preregistering in E241 Conron. Recommended: BIOES 274. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1995–96. Lecs and labs, T R 12:20–4:25; occasional field trips and special projects. Carpooling to the Vertebrate Collections at Research Park is necessary several times during the semester. Fee, $15. D. W. Winkler.  
Lectures cover various aspects of the biology of birds, including anatomy, physiology, systematics, evolution, behavior, ecology, and biogeography. Laboratory includes dissection of dead material, study of skeletons and plumages, and specimen identification of avian families of the world and species of New York. Independent projects emphasize research skills.

**BIOES 476 Biology of Fishes**  
Fall. 4 credits. Limited to 24 students. Recommended: BIOES 274 or equivalent experience in vertebrate zoology. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1995–96. Lecs, M W F 10:10; lab, M T or W 1:25–4:25. A small lab fee may be required. A. R. McCune.  
An introduction to the study of fishes: their structure, evolution, distribution, ecology, physiology, behavior, classification, and identification, with emphasis on local species. Live animals are studied in the field and are sometimes used in the laboratory for nondestructive demonstrations or experiments. The systematics and dissection laboratories use preserved specimens.

**BIOES 477 Ecosystem Biology**  
Analysis of ecosystems in terms of energy flow and nutrient cycles, emphasizing an experimental approach and comparative aspects of terrestrial, freshwater, and marine ecosystems. Consideration of anthropogenic effects on ecosystems, such as from acid precipitation and offshore oil pollution. Analysis of climate change and regional environmental change from an ecosystem perspective.

**BIOES 479 Paleobiology (also Geological Sciences 479)**  
Fall. 3 credits. Prerequisites: one year of introductory biology for majors and either BIOES 272 or 274, GEOL 375, BIOES 373, or permission of instructor. Offered alternate years. Lecs, M W F 12:20. J. C. Cline and staff.  
A survey of the major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of geology students and the geological backgrounds of biology students concerning the nature and significance of the fossil record for their respective studies.

**BIOES 660 Field Studies in Ecology and Systematics**  
Spring. Variable credit. Prerequisites: BIOES 261, 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. R. B. Root, P. L. Marks.  
This course provides students an opportunity to learn techniques and a new biota by participating in an intensive series of field exercises. An extended field trip is scheduled during either intersession or spring break. The region visited, trip objectives, and other details are announced by the instructor in the division's catalog supplement issued at the beginning of the semester. Meetings on campus are devoted to orientation and reports on completed projects. Class meets Thursday evenings at 7:30; class based at the Archbold Biological Station in central Florida. There are four evening meetings of class before departure.

**BIOES 661 Environmental Policy (also ALS 661 and Biology and Society 461)**  
Fall and spring. 3 credits each term. (Students must register for 6 credits each term, since an "R" grade is given at the end of the fall term.) Limited to 12 students. Prerequisite: permission of instructor. Sem, R 2:30–4:30. D. Pimentel.  
This course uses an interdisciplinary approach to focus on complex environmental and energy problems. Ten to twelve students, representing several disciplines, investigate significant environmental problems. The research team spends a two-semester preparing a scientific report for publication in Science or BioScience.

**BIOES 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
Theoretical population genetics (TPG) is one of the areas of current evolutionary biology. The course explores why TPG is successful in its domain and what its limitations are. Students analyze the effects of seven primary factors of population dynamics (mutation, selection, drift, migration, segregation, recombination, and non-random mating). Consideration of historically relevant situations when several factors act simultaneously (migration-drift, mutation-selection-drift, segregation-recombination-selection, etc.) leads to studying the changes of not only the population state, but of the "rules of the game" themselves (evolution of reproductive isolation, life history, recombination, mutability, etc.). Students study in detail several topics of general biological interest (maintenance of quantitative variability, evolution of aging, and sexual selection). Active use of computers in analyzing the models, but no formal training in programming required.

**BIOES 664 Seminar in Insect-Plant Interactions (also Entomology 664)**
Spring 2 credits. Intended for seniors and graduate students. Limited to 15 students. Prerequisites: courses in entomology, ecology, evolution, and organic chemistry and permission of instructor. S-U grades optional. Offered alternate years. Not offered 1995-96. Sem to be arranged. Staff. Presentations and discussions by students on the evolution of patterns of interaction between plants and insects, emphasizing critical evaluation of concepts and evidence.

**BIOES 665 Limnology Seminar**
Spring 1 credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional. Offered alternate years. Sem to be arranged. N. G. Hairston, Jr. A seminar course on advanced topics in freshwater ecology.

**BIOES 666 Principles of Biogeochemistry**

Lectures cover the biotic controls on the chemistry of the environment and the chemical control of ecosystem function. Emphasis is on cycles of major elements and minor elements globally and in selected ecosystems, stressing the coupling of element cycles. A comparative approach is used to illustrate similarities and differences in element cycling among ecosystems. Analysis of both theoretical and applied issues, including global atmospheric changes and factors controlling the acidification of lakes and soils.

**BIOES 667 Graduate Seminar in Vertebrate Biology**
Fall or spring. 1 credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional. Sem to be arranged. Staff. Seminar presentations and discussions by students on areas of current research in vertebrate biology. Topics vary from semester to semester.

**BIOES 672 Graduate Seminar in Physiological Ecology**
Spring 2 credits. May be repeated for credit. Limited to 12 students. Prerequisite: a course in plant or animal physiology, especially BIOES 466 or 467. Permission required for undergraduates. S-U grades only. Offered alternate years. Not offered 1995-96. Sem, 2 hours each week to be arranged. T. E. Dawson and staff.

Discussion of topics on water balance, energetics, and temperature regulation emphasize parallels and contrasts in the relations of animals and plants to their biophysical environments. Each student leads a discussion and prepares a written review of a topic, drawing on the primary literature of his or her own research interests.

**BIOES 673 Human Evolution: Concepts, History, and Theory (also Anthropology 673)**
Fall 3 credits. Prerequisite: one year of introductory biology, ANTHR 101, or permission of instructor. Offered alternate years. Not offered 1995-96. Lec, M 2:30-3:30 and disc, W 7:30-9:30 p.m. K. A. R. Kennedy.

The historical background of present-day concepts of man's evolutionary variations and adaptations in space and time is surveyed. The formation of biological anthropology as an area of scientific inquiry within the social and biological sciences is reviewed. Students select their own topics within a broad range of readings in the history of Western concepts of man's origin, diversity, and place in nature.

**BIOES 674 Principles of Systematics (also Entomology 674)**

An introduction to modern theory and methods of systematic biology. Lectures are on theoretical systematics and include species concepts, classification, phylogenetics, and biogeography. Laboratories include modern methods of analysis of data, including cladistic hand and computer methods and numerical methods. Laboratory grade is based in part on a final paper.

**BIOES 675 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.

**BIOES 676 Current Topics in Ecology and Evolutionary Biology**
Fall. 4 credits. Prerequisite: permission of instructor required for undergraduates. S-U grades only. Lecs and disc, T R 8-9:55. One weekend field trip. Staff. Critical evaluation and discussion of theory and research in ecology and evolutionary biology. Lectures by faculty and student-led discussions of topics in areas of current importance.

**Related Courses in Other Departments**
Advanced Soil Microbiology (Soil, Crop, and Atmospheric Sciences 666)
Advanced Work in Animal Parasitology (Veterinary Microbiology 737)
Animal Social Behavior (Biological Sciences 427)
Early People: The Archaeological and Fossil Record (Anthropology 203 and Archaeology 203)
Evolution of the Earth and Life (Biological Sciences BIO G 170 and Geological Sciences 102)
Marine Sciences Courses (Biological Sciences BIOSM 363-370, 477)
Related Courses in Entomology (Entomology 212, 331, 332, 370, 453, 471, 621, 631, 634, 636, 672)
Related Courses in Natural Resources (Natural Resources 270, 302)
Taxonomy of Vascular Plants (Biological Sciences BIOPL 248)
Teaching Experience (Biological Sciences BIO G 498)
Undergraduate Research in Biology (Biological Sciences BIO G 499)
Undergraduate Seminar in Biology (Biological Sciences BIO G 400)
Veterinary Parasitology (Veterinary Microbiology 510)
GENETICS AND DEVELOPMENT (BIOGD)

BIOGD 184 Understanding Genetics
Spring. 3 credits. May not be taken for credit after BIOGD 281 or 282. This course may be used toward the science distribution requirement of the College of Arts and Sciences and the Group B distribution requirement of the College of Agriculture and Life Sciences. This course may not be used to fulfill the requirements for any Program of Study in the biological sciences major. S-U grades optional. Lecs. M W F 9:05. T. D. Fox.

An introduction to genetics for students majoring in fields other than biology. Genetics is a rapidly developing science that is providing insight into all aspects of biology and practical tools which increasingly affect our lives. The course shows how major conclusions about inheritance have been drawn from experimental evidence, drawing on examples from the biology of humans, other animals, plants, fungi, and bacteria. It also illustrates current and future applications of genetic discoveries. For example, the basic principles of inheritance, in conjunction with methods for the isolation and detection of specific gene fragments, is used to understand the detection of genetic diseases and the identification of individuals (DNA fingerprinting). Other topics to be covered include the origin of mutations, use of genetic methods to alter the properties of organisms and the influence of inheritance on behavior.

BIOGD 281 Genetics
Fall, spring, or summer (8-week session). 5 credits. Not open to freshmen in fall semester. Enrollment may be limited to 200 students. Prerequisite: one year of introductory biology or equivalent; written permission of instructor required for students who have taken BIOGD 282. No admittance after first week of classes.
Lecs. T R 10:10–12:05; lab, T W F 2:30–4:25; additional hours to be arranged.

Students do not choose lab sections during course enrollment; lab assignments are made directly from class rosters. T. D. Fox, M. L. Goldberg, R. J. MacIntyre. A general study of the fundamental principles of genetics in eukaryotes and prokaryotes. Discussions of gene transmission, gene action and interaction, gene linkage and combinatorial distribution, gene structure, gene and chromosome mutations, genetic aspects of differentiation, genes in populations, breeding systems, and extrachromosomal inheritance. Aspects of recombinant gene technology are discussed. In the laboratory, students perform experiments with microorganisms and conduct an independent study of inheritance in Drosophila.

BIOGD 282 Human Genetics
Spring. 2 or 3 credits (2 credits if taken after BIOGD 281). Each discussion limited to 25 students. Prerequisite: one year of introductory biology or equivalent; permission of instructor required for students who have taken BIOGD 282. May not be taken for credit after BIOGD 184. S-U grades optional. Lecs. M W F 10:10 (Lecs, also F 10:10 1st 3 weeks only); disc, R 10:10 or Fr 10:10 or 11:15.

R. A. Calvo. A course designed for nonmajors. Lectures provide the technical background needed to understand controversial personal, social, and legal implications of modern genetics that are discussed in section meetings.

BIOGD 385 Developmental Biology
Fall. 3 credits. Prerequisite: BIOGD 281. Lecs. M W F 11:15. A. W. Blackler.

An introduction to the morphogenetic, cellular, and genetic principles of the developmental biology of animals.

BIOGD 389 Embryology

A course in the embryonic development of vertebrate animals, with emphasis on the comparative aspects of morphogenesis and function at the tissue level. The laboratory has a strong morphogenetic bias, emphasizing the comparative aspects of developmental anatomy. Preserved materials are used in the laboratory.

BIOGD 480 Seminar in Developmental Biology
Spring. 1 credit. May be repeated for credit. Limited to upperclass students. S-U grades on Seminar to be arranged. A. W. Blackler.

Topic for spring, 1996: The Vertebrate Limb.

BIOGD 481 Population Genetics
Fall. 4 credits. Prerequisite: BIOGD 281, BIOES 578, or equivalents. Lecs. M W F 10:10; disc. M 2:30 or T 1:25.
C. F. Aquadro.

Population genetics is the study of the transmission of genetic variation through time and space. The class explores how to quantify this variation, what the distribution of variation tells us about the structure of natural populations, and about the processes that lead to evolution. Topics include the diversity and measurement of genetic variation, mating and reproductive systems, selection and fitness, genetic drift, migration and population structure, mutation, multilocus models, the genetics of speciation, quantitative traits, and the maintenance of molecular variation.

Emphasis is placed on DNA sequence variation, and the interaction between theory and the data from human and natural populations. Specific case studies include the population genetic issues involved in DNA fingerprinting, the genetic structure and evolution of human populations, and the study of adaptation at the molecular level.

Examples are drawn from studies of animals, plants, and microbes.

BIOGD 482 Human Genetics and Society
Fall. 3 credits. Enrollment limited to 24 senior biological sciences majors, with preference given to students studying genetics and development. Prerequisites: BIOGD 281 and BIOBM 330 or 333 or 332. S-U grades optional. Disc. T 2:30–4:25 and R 2:30–3:30. R. A. Calvo, H. T. Stinson.

Presentation of some of the science and technology, plus discussion of the ethical, social, and legal implications of recent advances in human genetics. Among the topics considered are new reproductive strategies, reproductive counseling, genetic screening (prenatal, neonatal, presymptomatic, carrier, and workplace), wrongful life and wrongful birth, genetic effects of abused substances, genetics and behavior, and therapy for genetic diseases. Students lead most discussions. There is a major writing component in the course.

BIOGD 483 Molecular Aspects of Development
Spring. 3 credits. Prerequisites: BIOGD 281, BIOBM 332 (preferred) or 330 or 333; and BIOGD 385. Offered alternate years. Not offered 1995–96. Lecs. T R 2:30–4:00.

M. F. Wolner.

An advanced course in developmental biology, with emphasis on the molecular events underlying developmental processes. Simultaneously, a molecular biology course that focuses on how development modulates and uses transcriptional, post-transcriptional, translational and post-translational regulation of gene expression and cellular events such as cell-cell communication. Numerous developmental systems are discussed and analyzed in microorganisms, plants, and especially, animals including fruit flies, nematode worms, and vertebrates such as mice and humans.

Course readings include original research articles. Discussion emphasizes specific experiments and approaches, results and their interpretation.

BIOGD 484 Molecular Evolution
Spring. 3 credits. Prerequisites: BIOGD 281 and organic chemistry. Offered alternate years. Lecs. T 11:15.
R. J. MacIntyre.

An analysis of evolutionary changes in proteins and nucleic acids. Theories on the evolution of the genetic code and the construction of phylogenetic trees from biochemical data are discussed. The second half of the course concerns the evolution and the organization of genomes from viruses to higher eukaryotes.

BIOGD 486 Fertilization and the Early Embryo
Spring. 2 credits. Prerequisites: BIOGD 281, BIOBM 332 (preferred), 330 or 333, and BIOGD 385. Offered alternate years. Lecs. R 2:30–4:25.

M. F. Wolner.

This course covers the earliest events in the formation of a new organism. The methods and findings of genetic, developmental, and molecular analyses are discussed. Readings in the recent literature and discussions focus on pre-gastrula events in development of animal species. Topics include fertilization, pro-nuclear fusion, triggering mitosis, cleavage divisions, cytoplasmic determinants, changes in nuclear and cytoplasmic architecture, and midblastula transition.

BIOGD 488 Advanced Topics in Population Genetics

An in-depth exploration of current areas of research in population genetics. Readings primarily from recent books and the current literature. Specific topics are announced the previous fall and in the division's catalog supplement. Format includes lectures, discussion, and presentations by students.

BIOGD 489 Mammalian Development
Spring. 3 credits. Limited to 25 students. Prerequisites: BIOGD 281, BIOBM 330 or 332, and BIOGD 385, or their equivalents.
An in-depth study of mammalian development using the mouse as the animal model. The course covers classical embryology beginning with gametogenesis followed by morphogenetic and biochemical analyses of pre- and post-implantation development. Current topics in experimental embryology, including genetic analysis of mutants, study of cell lineage with chimeras, in vitro culturing of embryonic stem cells, and molecular approaches to understanding development are examined.

BIODG 687 Developmental Genetics
Fall. 2 credits. Limited to 20 students. Prerequisites: BIODG 281 and 305 or their equivalents. S-U grades optional. Offered alternate years. Lec to be arranged. K. J. Kemphues. Selected topics focus on the use of genetic analysis in understanding mechanisms of development. Topics are drawn primarily from studies in Drosophila, Caenorhabditis, and mouse. Possible topics include pattern formation, cell lineage, neural development, material information in development, germ cell development, sex determination, and intercellular communication. Students read current literature and are given the opportunity to discuss each topic in class.

BIODG 780 Current Topics in Genetics
Fall or spring. 2 credits. May be repeated for credit. Primarily for graduate students, with preference given to majors in the Field of Genetics, written permission of instructor required for undergraduates. Limited to 20 students. No auditors. S-U grades optional, with permission of instructor. Sem to be arranged. Staff. A seminar course with critical presentation and discussion by students of original research papers in a particular area of current interest. Content of the course and staff direction vary each year and are announced a semester in advance.

BIODG 781 Problems in Genetics and Development
Fall. 2 credits. Limited to first-year graduate students in the Field of Genetics and Development. Disc to be arranged. Staff. An introduction to the research literature in selected areas through weekly problem sets and discussions.

BIODG 782-783 Current Genetics/Development Topics
Fall or spring. 1/2 or 1 credit for each topic. May be repeated for credit. S-U grades only. Lectures and seminars on specialized topics to be announced.

BIODG 786 Research Seminar in Genetics and Development
Fall and spring. 1 credit. Limited to and required of second-, third-, and fourth-year graduate students in Genetics and Development. S-U grades only. Sem, W 12:20-1:25. Staff.
Each graduate student presents one seminar per year based on his or her thesis research. The student then meets with the thesis committee members for an evaluation of the presentation.

BIODG 787 Seminar in Genetics and Development
Fall or spring. 1 credit. Limited to graduate students in Genetics and Development. S-U grades only. Sem, M 4-5:00. Staff. Seminars in current research in genetics and developmental biology conducted by distinguished visitors and staff.

Related Courses in Other Departments
Advanced Plant Genetics (Plant Breeding 606)
Animal Development (Veterinary Anatomy 507)
Biocytogenesis of Macromolecules (Biological Sciences [BIOBM] 633)
Current Topics in Biochemistry (Biological Sciences [BIOBM] 731-736)
Evolutionary Biology (Biological Sciences [BIOES] 578)
Laboratory in Molecular Biology and Genetic Engineering of Plants (Biological Sciences [BIOPL] 347)
Laboratory in Plant Molecular Biology (Biological Sciences [BIOPL] 641)
Molecular Biology and Genetic Engineering of Plants (Biological Sciences [BIOPL] 343)
Neurogenetics (Biological Sciences [BIONB] 423)
Plant Cytogenetics (Plant Breeding 446)
Plant Growth and Development (Biological Sciences [BIOPL] 644)
Plant Molecular Biology I (Biological Sciences [BIOPL] 653)
Plant Molecular Biology II (Biological Sciences [BIOPL] 652)
Protein-Nucleic Acid Interactions (Biological Sciences [BIOMI] 692)
The Nucleus (Biological Sciences [BIOBM] 639)
Undergraduate Research in Biology (Biological Sciences [BIO G] 499)
Yeast Genetics and Molecular Biology (Biological Sciences [BIOBM] 438)

BIOMI 192 Microorganisms on the Planet Earth
A course in microbiology designed to introduce students, who have a limited background in science, to the microorganisms that populate our planet earth. Among the microorganisms studied are the bacteria, the archaea/bacteria, some of the single-celled plants and animals, and the viruses. Topics covered are the basic nature of microorganisms, their evolution on earth, their composition and growth, their role in the ecology of this planet, their role in human history and disease, and their use in bioengineering. This course is not a prerequisite for advanced courses in microbiology.

BIOMI 290 General Microbiology, Lectures
Fall, spring, or summer (6-week session). 2 or 3 credits (2 credits if taken after BIOMI 192). Prerequisites: one year of introductory biology for majors and one year of college chemistry, or equivalent. Recommended: concurrent registration in BIOMI 291. Lecs, M W F 11:15. M. L. Cords, S. M. Merkl.
A comprehensive overview of the biology of microorganisms, with emphasis on bacteria. Topics include microbial cell structure and function, physiology, metabolism, genetics, diversity, and ecology. Applied aspects of microbiology are also covered such as biotechnology, the role of microorganisms in environmental processes, and immunology and medical microbiology.

BIOMI 291 General Microbiology, Laboratory
Fall or spring. 2 credits. Summer (6-week session), 2 or 3 credits. Prerequisite: concurrent or previous enrollment in BIOMI 290. Labs, M W 2-4:25, or T R 11:15-1:45 or 2-4:25. C. M. Rehkugler. A study of the basic principles and techniques of laboratory practice in microbiology, and fundamentals necessary for further work in the subject.

BIOMI 292 General Microbiology, Discussion
Spring. 1 credit. Prerequisite: concurrent or previous enrollment in BIOMI 290. S-U grades only. Disc to be arranged. C. M. Rehkugler, E. Seacord.
A series of discussion groups in specialized areas of microbiology to complement BIOMI 290.

BIOMI 300 Seminar in Microbiology
Spring. 1 credit. Required of biological science students in the microbiology program of study. Strongly recommended for students considering the microbiology program of study. S-U grades only. Sem, W 12:20. Staff.
A series of lectures and seminars designed to present students with laboratory safety training and acquaint them with research projects in microbiology on the Cornell campus.

BIOMI 304 Pathogenic Bacteriology and Mycology [also Veterinary Microbiology 318]
Spring. 2 or 4 credits (4 credits with lecture and laboratory). Limited to 40 students. Prerequisites: BIOMI 290 and 291. Strongly recommended: BIO G 305. Offered alternate years. Lecs, T R 1:25, labs, T R 2:25-5:00. E. Tullson. The study of the major bacterial and fungal agents of infectious disease, with emphasis on the function of virulence mechanisms and the host-parasite interaction. Lectures cover the significance of normal flora, antibiotic therapy and drug resistance. Laboratory emphasizes techniques for isolation, culture, and identification of infectious agents. Animal models are used to help understand certain pathogenic mechanisms.

BIOMI 391 Advanced Microbiology Laboratory
Fall. 3 credits. Prerequisites: BIOMI 290, 291, and BIOMI 330 or 331 or 333. Preference given to biological sciences students in the microbiology program of study. Lab, M W or T R 1:25-4:25, disc, F 1:25. J. B. Russell and staff. A laboratory course that illustrates basic principles of experimental microbiology. The course is organized into four modules which...
BIOMI 398 Environmental Microbiology
Spring. 3 credits. Prerequisite: BIOMI 290 or BIOM 330 or SCAS 260 or permission of instructor. Offered alternate years. Not offered 1995–96. Lects, M W F 10:10. W. C. Ghiorse, F. L. Madsen.
The biology, behavior, and function of microorganisms in natural environments are discussed in relation to past and present environmental conditions on Earth. The role of microorganisms in ecologically and environmentally significant processes is also considered through discussion of specific topics such as elemental cycles, nutrient cycling, transformation of pollutant chemicals, wastewater treatment, and environmental biotechnology.

BIOMI 406 Clinical Microbiology
Fall and spring. 15 credits each semester. Prerequisite: permission of instructor. Honors course in clinical microbiology in the hospital laboratory of the Cornell Medical College and New York Hospital in New York City. Emphasis is on development of student capability in the isolation and rapid identification of organisms from various types of clinical specimens. This course is intended to prepare the student for state and federal licensing in various areas of clinical microbiology. This is a full-time program, taking place from September to August of the student's senior year.

BIOMI 408 Viruses and Disease (also Veterinary Microbiology 417)
Spring. 3 credits. Prerequisites: BIOMI 290, 291; BIO G 305; and permission of instructor. Recommended: BIOMG 281. Lects, M W F 10:10 p.m. J. Casey.
The course covers basic concepts in virology with emphasis on virus-host interactions, strategies for gene regulation, and mechanisms of pathogenicity. Selected viral infections that result in immune dysfunction and neoplasia are highlighted in the context of approaches to prevent or reduce the severity of diseases.

BIOMI 415 Bacterial Diversity
Fall. 3 credits. Prerequisites: BIOMI 290, 291, and BIOMB 330 or 331 or 333. Not offered 1995–96. Lects, M W F 11:15. S. H. Zinder.
A consideration of the physiology, ecology, genetics, and practical potential of important groups of bacteria. Topics include molecular methods for determining bacterial phylogeny and taxonomy, the evolution of diverse mechanisms of energy conservation, fixation of carbon and nitrogen, and adaptation to extreme environments.

BIOMI 416 Microbial Physiology
Spring. 3 credits. Prerequisites: BIOMI 290, 291, and BIOMI 330 or 331 or 333, or their equivalents. S. H. Zinder.
The concern is with the physiological and metabolic functions of microorganisms. Consideration is given to chemical structure, regulation, growth, and the energy metabo-
NEUROBIOLOGY AND BEHAVIOR (BIONB)

BIONB 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3 or 4 credits (4 credits with discussion section and written projects, or writing-intensive section). 4-credit option required of all students studying neurobiology and behavior. Each discussion limited to 20 students, with preference given to students studying neurobiology and behavior. Not open to freshmen. Prerequisite: one year of introductory biology for majors and one year of chemistry. May be taken independently of BIONB 222. S-U grades optional. Lecs, M W F 12:20; disc. to be arranged. T. J. DeVoogd. A general introduction to the field of cellular and integrative neurobiology. Topics include neural systems, neuroanatomy, developmental neurobiology, electrical properties of nerve cells, synaptic mechanisms, neurochemistry, motor systems, sensory systems, learning, and memory.

BIONB 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits (4 credits with discussion and written projects). 4-credit option requires inclusion of students studying neurobiology and behavior. Each discussion limited to 20 students, with preference given to students studying neurobiology and behavior. Not open to freshmen. Prerequisite: one year of introductory biology for majors and one year of chemistry. May be taken independently of BIONB 221. S-U grades optional. Lecs, M W F 12:20; disc. to be arranged. M. Salpeter. A general introduction to the field of cellular and integrative neurobiology. Topics include neural systems, neuroanatomy, developmental neurobiology, electrical properties of nerve cells, synaptic mechanisms, neurochemistry, motor systems, sensory systems, learning, and memory.

BIONB 322 Hormones and Behavior (also Psychology 322)
Spring. 3 or 4 credits; the 4-credit option involves a one-hour section once a week in which students are expected to read original publications in the field and participate in discussion. Limited to juniors and seniors; open to sophomores only by permission. Prerequisites: BIONB 221 or 222 or one year of introductory biology plus a course in psychology. S-U grades optional. Lecs, M W F 11:15; disc. to be arranged. D. Gudemuth. Following a review of the neural and endocrine systems, this course connects endocrine physiology to specific behaviors observed in various species, including humans. Although the relationship between sexual physiology and behavior is strongly emphasized, the lectures also describe hormonal contributions to parental behavior, aggression, stress, learning and memory, homeostasis, and biology rhythms. Topics for the discussion sections are chosen by the students within the context of hormonal influences on behavior.

BIONB 324 Biopsychology Laboratory (also Psychology 324)
Fall. 4 credits. Limited to 20 upperclass students. Prerequisites: laboratory experience in biology or psychology, BIONB 221 and 222 or PSYCH 123 and 222, and permission of instructor. Labs, T R 12:55-1:45. T. J. DeVoogd. Experiments designed to provide research experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included. Live animals are used in the laboratory.

BIONB 325 Neurodeisases - Molecular Aspects
Fall. 3 credits. Prerequisites: two courses from BIONB 222, BIOG 281, BIOBM 330, or 331; registration in one of the two is acceptable. S-U grades optional. Offered alternate years. Lecs, T R 9:05; disc. T 2:30. T. R. Podleski. The intent of this course is to teach students how to use molecular and DNA techniques for the study of neurodeisases. How are genes responsible for diseases identified and how are the functions of these genes studied? Attention is focused on those neural diseases in which significant advances have been made using these techniques, for example Alzheimer's, Huntington's, color blindness, affective disorders, disorders affecting ion channels, and muscular dystrophies. In addition to the molecular studies, when appropriate, time is devoted to discussions of other aspects of the diseases. Emphasis is placed on how these are a useful approach to studying the nervous system by exposing the functions of genes that would be difficult to identify in other ways.

BIONB 326 The Visual System
Spring. 4 credits. Prerequisite: BIONB 222 or BIOAP 311, or permission of instructor. S-U grades optional. Offered alternate years. Lecs, M W F 10:10; disc. 1 hour each week to be arranged. H. C. Howland. The visual systems of vertebrates are discussed in breadth and depth. Topics covered include the optics of eyes, retinal neurophysiology, structure and function of higher visual centers, and ocular development.

BIONB 328 Biopsychology of Learning and Memory (also Psychology 332)
Spring. 3 credits. Prerequisites: one year of biology and either a course in biopsychology or BIONB 222. Lecs, M W F 11:15. T. J. DeVoogd. This course surveys the approaches that have been or are currently being used in order to understand the biological bases for learning and memory. Topics covered include the optics of eyes, retinal neurophysiology, structure and function of higher visual centers, and ocular development.

BIONB 396 Introduction to Sensory Systems (also Psychology 396)
Spring. 3 or 4 credits (4 credits with term paper). Registrants for the 4-credit option requires permission of instructor. Prerequisites: an introductory course in biology or biopsychology, plus a second course in neurobiology or behavior or perception or cognition or biopsychology. Students are expected to have elementary knowledge of perception, neuropsychology, behavior, and chemistry. No auditors. Offered alternate years. Lecs, M W F 10:10. B. P. Harrar. This course is taught using the Socratic method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with both the characteristics of sensory systems that are common across living organisms and those sensory properties which represent adaptations of animals to particular habitats or environments. Classroom discussion can increase, but not decrease, a student’s final grade. There are two preliminary exams and a final exam. The principles and limitations of major methods used to examine sensory systems are considered. General principles of sensory systems (also Psychology 396) and auditory, visual, and somesthetic systems are covered. One aspect of each system (e.g., localization of objects in space by sound, color vision, and thermoreception) is selected for special attention. Two or more textbooks, and a course packet of reproduced articles are used. At the level of An Introduction to the Physiology of Hearing, 2nd edition, by J. O. Pickles, Physiological acoustics, neural coding, and psychoacoustics, by W. L. Gulick, G. A. Gescheider, and R. D. Frisina, The Retina: An approachable part of the brain, by J. E. Dowling, Handbook of Physiology—The Nervous System. III, Sensory Processes, edited by J. M. Brookhard and V. B. Mountcastle.
BIONB 420 Topics in Neurobiology and Behavior
Fall or spring. Variable credit. May be repeated for credit. Primarily for undergraduates. S-U grades optional. To be arranged. Staff.
Courses on selected topics in neurobiology and behavior, can include lecture and seminar courses. Topics, instructors, and time of organizational meetings are listed in the division's catalog supplement issued at the beginning of the semester.

BIONB 421 Effects of Aging on Sensory and Perceptual Systems (also Psychology 431 and 631)
Fall. 3 or 4 credits (4 credits with term paper). Limited to 25 students. Prerequisites: Introductory course in biology or psychology, plus a second course in perception, neurobiology, cognition, or biopsychology. No auditors. S-U grades optional. Offered alternate years. Lecs, T, R 9:05-11:05; R, M W 2:30-4:30. B. P. Halpern.
A literature-based examination of post-maturation changes in the perceptual, structural, and physiological characteristics of somesthetic, chemosensory, visual and auditory systems. Emphasis is on human data, with non-human information included when especially relevant. The course examines the current developments in human sensory prosthetic devices, and in regeneration of receptor structures. Emphasis is on human data, with non-human information included when especially relevant. The course examines the current developments in human sensory prosthetic devices, and in regeneration of receptor structures.

BIONB 422 Modeling Behavioral Evolution
Spring. 4 credits. Limited to 25 students. Prerequisites: BIONB 221, one year of calculus, one course in probability or statistics, and permission of instructor (Office: W309 Mudd Hall; phone: 255-5594). This course is open to advanced undergraduates and graduate students. S-U grades optional. Lecs, T, R 2:30-4:00; computer lab, one class period per week to be arranged. H. K. Reeve.
This is an intensive lecture and computer lab course on modeling strategies and techniques in the study of behavioral evolution. Popula­tion-genetics (including quantitative-genetics), static optimization, dynamic programming, and game-theoretic methods are emphasized. These approaches are illustrated by application to problems in optimal foraging, sexual selection, sex ratio evolution, animal communication, and the evolution cooperation and conflict within animal social groups. Students learn to use the theory and techniques of model­ling evolutionary theories of animal behavior, as well as to develop their own testable models for biological systems of interest or to extend pre-existing models in new directions. The Mathematica software program is used as a modeling tool in the accompanying computer lab (no prior experience with computers required).

BIONB 423 Neurogenetics
Fall. 3 credits. Limited to junior, senior, and graduate students. Prerequisites: permission of instructor, one year of introductory biology or equivalent, and BIOGD 281. Strongly recommended: BIONB 222. S-U grades optional. Offered alternate years. Lecs, T, R 2:30; disc, R 3:35. A. M. Schneiderman.
Lectures, discussions, and student presentations focus on the uses of genetics for the study of the nervous system. Emphasis is on recent advances in genetic and molecular biological techniques and their application to the study of neural development and behavior. Both vertebrate and invertebrate systems are discussed, and main consideration is given to the fruit fly and the mouse. Readings are taken primarily from original journal articles.

BIONB 424 Neuroethology (also Psychology 424)
Spring. 3 credits. Limited to 20 students. Prerequisites: BIONB 221 and 222. Offered alternate years. Lecs, T, R 9:05-11:05; R, M W 2:30-4:25. C. D. Hopkins.
In the 1950s through the 1970s, ethologists attempted to understand the mechanisms of animal behavior through the use of comparative methods, evolutionary analysis, careful observations of animals in their native habitats, and clever experimentation. Now, with the explosion of basic theories and techniques in the neurosciences, many of the ethologist's methods are being explained in terms of neural systems. This course reviews the status of research in neuroethology and exposes students to the mechanisms of acoustic communication in insects and in vertebrates, echolocation in bats and sound localization in owls, electroreception and electroloration, and visual processing. In addition, the course reviews studies of the neural systems involved in decision making, in initiating action, and in coordinating fixed acts. Assigned readings include original articles from the scientific literature. A term paper or equivalent is required. Recitations scheduled in class.

BIONB 426 Electronics for Neurobiology
Spring. 3 credits. Limited to 20 students. Prerequisites: BIONB 222 and one year of introductory physics. Offered alternate years. Not offered 1995-96. Lecs, T R 9:05; lab, 4 hours each week to be arranged. Staff.
The course deals with electronics as applied to neurobiology and behavior. Analog circuits centered around operational amplifiers are emphasized. Topics include a review of basic electrical concepts, the cell as circuit, voltage, and current amplifiers, transducers (temperature, light, pressure, etc.); filtering; timing circuits, radiotelemetry, basic trouble shooting, and reading schematics. In the last third of the term, students design and construct a circuit (both circuit board and housing box) of their own choosing related to their research and/or interests.

BIONB 427 Animal Social Behavior
Fall. 4 credits. Limited to 30 students. Prerequisites: BIONB 221 and BIOES 261 or 278, and permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1995-96. Lecs and disc, M W 2:30-4:25. S. T. Emlen.
An intensive computer lab course designed to teach the theory and techniques of modern cellular neurophysiology. Lecture time is used to present laboratory exercise results, to supplement laboratory topics, and for discussion of primary research papers. Intracellular and extracellular recording techniques are used to analyze neuronal properties such as resting potentials, electrical and chemical synaptic transmission, ionic currents under voltage clamp, and functional expression of foreign membrane proteins in Xenopus oocytes. A variety of preparations are used as model systems. Computer acquisition and analysis of laboratory results are emphasized.

BIONB 428 Topics in Behavior
Fall or spring. 2-4 credits. (Credits based on number of lectures and/or field exercises as outlined in the division's catalog course supplement and subject to approval through the instructor or the division's catalog supplement issue.) May be repeated for credit. Primarily for undergraduates. S-U grades optional.
Courses on selected topics in behavior; can include lecture and seminar courses, may include laboratory. Past topics have included animal orientation, insect behavior, bio-rhythms, and communication. Topics, instructors, and time of organizational meeting are listed in the division's catalog supplement issued at the beginning of each semester.

BIONB 429 Olfaction and Taste: Structure and Function (also Psychology 429)
Fall. 3 or 4 credits (4 credits with term paper or research project, which can, but need not, study non-human vertebrates). Preference given to junior and senior psychology and biology majors and graduate students. Graduate students, see PSYCH 629. Prerequisite: a 300-level course in biophysics or equivalent. Offered alternate years. Not offered 1995-96. Lecs, T, R 9:05. B. P. Halpern.
The structural and functional characteristics of olfaction and taste are explored by reading and discussing current literature in these areas. Structure is examined at the light levels of electron microscopes as well as at the molecular level. Function is examined primarily in its neurophysiological and biochemical aspects. The emphasis is on vertebrates, especially air-breathing vertebrates in the case of olfaction, although there is some coverage of invertebrate forms. A textbook and a course packet of reproduced articles are used. At the level of Smell and Taste in Health and Disease, edited by T. V. Getchell, R. L. Dory, L. M. Bartoshuk, and J. B. Snow; The Neurobiology of Taste and Smell, edited by T. E. Finger and W. L. Silver.)

BIONB 491 Principles of Neurophysiology
Spring. 4 credits. Limited to 20 students. Prerequisite: BIONB 222 or written permission of instructor. S-U grades optional for graduate students. Lecs, M W 10:10; lab, M or W 12:20-4:25; additional hours to be arranged. B. R. Johnson.
A laboratory-oriented course designed to teach the theory and techniques of modern cellular neurophysiology. Lecture time is used to present laboratory exercise results, to supplement laboratory topics, and for discussion of primary research papers. Intracellular and extracellular recording techniques are used to analyze neuronal properties such as resting potentials, electrical and chemical synaptic transmission, ionic currents under voltage clamp, and functional expression of foreign membrane proteins in Xenopus oocytes. A variety of preparations are used as model systems. Computer acquisition and analysis of laboratory results are emphasized.

BIONB 492 Sensory Function (also Psychology 492)
Spring. 3 or 4 credits. (The 4-credit option involves a one-hour section once a week, in which students are expected to
Development of membrane ion channels permeation and channel gating are discussed. membrane ion channels, beginning with basic The functional and mechanistic aspects of co-evolution of vertebrate brain and behavior.

BIONB 495 Membrane Ion Channels
Fall. 3 credits. Prerequisite: BIONB 222, or permission of instructor. S-U grades optional, with permission of instructor. Offered alternate years. Not offered 1995–96. Lecs, M W F 9:05. R. Booker. Lectures covering the development of the nervous system, taking examples from both vertebrates and invertebrates. Emphasis is on cellular and molecular issues, that is, how neurons differentiate and organize by the role of cues such as hormones and developmental genes in neural development is discussed. Readings are taken from original journal articles.

BIONB 496 Bioacoustic Signals in Animals and Man
Spring. 3 credits. Limited to 12 junior, senior, and graduate students. Prerequisites: introductory biology, PHY 101–102 or 207–208, and permission of instructor. S-U grades optional.

Offered alternate years. Not offered 1995–96. Lecs, M W F 9:05, lab to be arranged. C. W. Clark, R. R. Hoy. Humans and most terrestrial animals live in a world of sound. Acoustic signals mediate social interaction and predator-prey behavior. This course teaches students about animal acoustical communication by introducing them to the different communication systems that are based on sound. The course presents the physical basis for sound, the physiological mechanisms of sound production and hearing, and an analysis of the behavioral context of signaling. In the laboratory students learn how to record, synthesize, and analyze acoustic signals with the aid of tape recorders and the Macintosh computer. Laboratories are designed around the lecture material and provide "real-world" exercises designed to stimulate discovery of the fundamental principles described in class. Class research projects on a selected topic in bioacoustics are required. The laboratory is based on software instrumentation running on a Macintosh II platform equipped with A/D-D/A data acquisition boards.

BIONB 497 Neurochemistry and Molecular Neurobiology
Fall. 3 credits. Limited to 30 students. Prerequisites: BIONB 222 and either BIOL 330 or 331, or permission of instructor. S-U grades optional. Offered alternate years. Lecs, T R 9:05; disc, T 2:25. R. M. Harris-Warrick. This course focuses primarily on the biochemistry/molecular biology of neurons. Emphasis is on the molecular properties of these cells that account for their unique function. The pre-synaptic and post-synaptic mechanisms and action of the major classes of neurotransmitters are discussed, as well as selected neuromodulators and hormones. Readings are selected primarily from research journals.

NEUROBIOLOGY AND BEHAVIOR 145
A lecture-seminar course on selected topics in cellular and molecular neurobiology. Students read original papers in the scientific literature and lead discussions of these articles. Suggestions for topics may be submitted by faculty or students to the chair of the Section of Neurobiology and Behavior. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

**BIONB 792 Advanced Laboratory in Cellular and Molecular Neurobiology** Fall or spring. 2 credits. May be repeated for credit. Primarily for graduate students. Prerequisites: BIOBM 330 or 331 or equivalent, BIONB 491 or equivalent, and written permission of instructor. S-U grades optional. Lab to be arranged. Staff.

A two-week intensive laboratory course designed to provide experience with a specific technique currently used in cellular and molecular neurobiology. The technique under study and instructor in charge vary from semester to semester and are listed in the division's catalog supplement issued at the beginning of the semester.

**BIONB 793 Advanced Topics in Integrative Neurobiology** Fall or spring. Variable credit. May be repeated for credit. Primarily for graduate students; written permission of instructor required for undergraduates. S-U grades optional. Lects and disc to be arranged. Staff.

A course designed to provide in-depth knowledge of current research in anatomical and physiological bases of vertebrate and invertebrate behavior. Readings are primarily from specialty books and selected journal articles. Topic and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

**BIONB 794 Advanced Laboratory Techniques in Integrative Neurobiology** Fall or spring. Variable credit. May be repeated for credit. Prerequisite: permission of instructor based upon a personal interview. Lab to be arranged. Staff.

A laboratory in the integrative, or neuroethological, approach to studies of animal behavior. Designed to provide practical working knowledge of research methods in anatomical, physiological, and behavioral approaches to studies of vertebrate and invertebrate behavior. Laboratory technique to be covered and instructor are listed in the division's catalog supplement issued at the beginning of the semester.

**Related Courses in Other Departments**

- Animal Behavior (Psychology 535)
- Biochemistry and Human Behavior (Psychology 361 and Nutritional Sciences 361)
- Brain and Behavior (Psychology 425)
- Developmental Biopsychology (Psychology 422)
- Evolution of Human Behavior (Psychology 326)
- Human Behavior: A Sociobiological Perspective (Anthropology 476)
- Insect Behavior Seminar (Entomology 662)
- Neurobiology of Animal Behavior (Biological Sciences [BIOBM] 427)
- Primate and Evolution (Anthropology 490)

**PLANT BIOLOGY (BIOPL)**

**BIOPL 241 Introductory Botany** Fall. 3 credits. Lects, T R 9:05; lab, M T W or R 1:25-4:25, or W 7:30-10:30 p.m. K. J. Niklas.

Introductory botany for those interested in 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 required to attend the afternoon field trips.

**BIOPL 242 Plant Physiology, Lectures** Spring. 3 credits. Primarily for undergraduates in agricultural sciences, but also for any Biological Sciences students wanting to know about plant function. Suitable as a second-level course for majors to satisfy the biology distribution requirement. Prerequisites: one year of introductory biology and/or BIOPL 241. Recommended: one year introductory chemistry. Concurrent enrollment in BIOPL 242 preferred, but not required; may be repeated. Lab credit required; may be repeated for credit. Lect, M W F 10:10. P. J. Davies.

How plants function and grow. Examples deal with crop plants or higher plants where possible, though not exclusively. Topics include cell structure and function, plant metabolism, including photosynthesis; light relations in crops; plant-water relations; water uptake, transport, and transpiration; irrigation and crop production; sugar transport; mineral nutrition; growth and development—hormones, flowering, fruiting, dormancy, and abscission; stress; tissue culture; and genetic engineering.

**BIOPL 243 Taxonomy of Cultivated Plants** Fall. 4 credits. Prerequisite: one year of introductory biology or written permission of instructor. May not be taken for credit after BIOPL 248. Not offered 1995-96.


A study of ferns and seed plants, their relationships, and their classification into families and genera, emphasizing cultivated plants. Particular emphasis is placed on gaining proficiency in identifying and distinguishing families and in preparing and using analytic keys. Additional emphasis given to the economic importance of taxa, to the basic taxonomic literature, and to the elements of nomenclature.

**BIOPL 244 Plant Physiology, Laboratory** Spring. 2 credits. Prerequisite: concurrent enrollment in BIOPL 242. May not be taken for credit after BIOPL 344. Disc and lab, M T W or R 12:20-4:25. C. Reiss.

Experiments exemplify concepts covered in BIOPL 242 and offer experience in a variety of biological and biochemical techniques, including use of small amounts of radiotopes.

**BIOPL 245 Plant Biology** Summer (6-week session). 3 credits. Limited to 24 students. Lecs, M-F 11:30-12:45; labs, M W 2-5:00. S. Williams.

Introductory botany, including plant identification. Emphasizes structure, reproduction, and classification of angiosperms. Most of the laboratory work is conducted outdoors in an area that surpasses most biological stations. Those who lack college-level biology are expected to work more closely with the instructor on supplemental instructional materials.

**BIOPL 246 Plants and Civilization** Spring. 3 credits. Lecs, T R 11:15; disc, T or W 1:25 or W R 12:20. D. M. Bates.

A consideration of the role that plants have played and continue to play in the evolution of human cultures. Emphasis is on the interactions between humans and the plant environment, the nature of plants and manner in which humans use and integrate them into their cultures, and the problems and concerns related to contemporary and future use of plant resources.

**BIOPL 248 Taxonomy of Vascular Plants** Spring. 4 credits. Prerequisite: one year of introductory biology. May not be taken for credit after BIOPL 243, S-U grades optional. Lects, M W F 9:05; lab, W or R 1:25-4:25. J. J. Davis.

An introduction to the classification of vascular plants, with an emphasis on the core factors of taxonomy, the processes of plant evolution, and the means of analyzing evolutionary relationships among plants. The laboratory concentrates on methods of plant identification and presents an overview of vascular plant diversity, with particular attention to the flowering plants.

**BIOPL 341 Plants in Laboratory Teaching**

Fall. 2 credits. Limited to 16 students. Prerequisite: one year of introductory biology. S-U grade optional. Disc and lab, F 2:30-4:25. C. Reiss, D. J. Paolillo.

This course is intended for science education students who intend to teach biology at the high school level. The focus is on how to use plants in the biology laboratory in interesting ways, with particular emphasis on using plants to demonstrate basic biological principles. Hands-on experience is provided in experimental set-up and performance. Additional emphasis given to experimental design, data collection and analysis, and actual experience in a high school biology teaching laboratory.

**BIOPL 342 Plant Physiology, Lectures** Spring. 3 credits. Prerequisites: one year of introductory biology, organic chemistry, and either concurrent enrollment in BIOPL 344 or written permission of instructor. May not be taken for credit after BIOPL 242 unless written permission is obtained from instructor.


The behavior, growth, transport processes, and environmental response of plants. Topics include membrane properties, solute and water transport, and function of osmotic forces; mineral and organic nutrition; stress resistance, growth and development controls;
metabolism, including photosynthesis and respiration, and responses to environmental influences.

**BIOPL 343 Molecular Biology and Genetic Engineering of Plants**
Fall. 2 credits. Prerequisite: one year general biology or permission of instructor. S-U grades optional. Lecs, T R 11:15-12:30. M. E. Nasrallah.

An introduction to current studies involving recombinant DNA technology and its application to the analysis of basic plant processes. The course emphasizes genetic transformation methodology, molecular genetic approaches to the study of selected plant systems, and prospects for plant improvement using biotechnology. The course is directed at undergraduates who wish to become familiar with plants as experimental organisms. Selected topics attempt to illustrate the uniqueness of plant life and how it differs from other systems.

**BIOPL 344 Plant Physiology, Laboratory**
Spring. 2 credits. Prerequisite: concurrent enrollment in BIOPL 342. May not be taken for credit after BIOPL 344. Similar to BIOPL 244 but at a more advanced level. Lab, W 1:25-4:25; disc, W 12:20. C. Reiss. Experiments exemplify concepts covered in BIOPL 342 and offer experience in a variety of biological and biochemical techniques, including use of small amounts of radioisotopes.

**BIOPL 345 Plant Anatomy**
Fall. 4 credits. Limited to 15 students. Prerequisite: one year of introductory biology or a semester of botany. Offered alternate years. Lecs, M W 9:05; labs, M W 2:45-4:25. D. J. Paolillo. A descriptive course with equal emphasis on development and mature structure. Lecture, laboratory, and reading are integrated in a study guide. The laboratory offers the opportunity to develop the practical skills required to make anatomical diagnoses and to write anatomical descriptions.

**BIOPL 346 Algal Physiology**
Fall. 3 credits. Prerequisite: one year of introductory biology for majors and BIOPL 242 or 342, or permission of instructor. S-U grades optional. Offered alternate years. Lecs, T R 8:30-9:55. T. G. Owens. This course takes an interdisciplinary approach to the study of algae with an emphasis on the physiology, biochemistry, and ecology of this diverse group of organisms. The algal classes are briefly described with consideration of traditional and emerging criteria for classification of the algae. The majority of the course focuses on interactions of algae with the physical, chemical environment, uptake of inorganic compounds, algal photosynthesis, metabolic strategies, and population dynamics of planktonic algae and benthic macrophytes. There is no laboratory section with this course.

**BIOPL 347 Laboratory in Molecular Biology and Genetic Engineering of Plants**
Fall. 2 credits. Limited to 24 students. Prerequisite: BIOPL 343 or permission of instructor. Concurrent enrollment is BIOPL 343 is encouraged. S-U grades optional. Lab, W 1:25-4:25. M. E. Nasrallah. The laboratory provides experience in handling and experimenting with the plant

**Arabidopsis thaliana.** Selected experiments include the preparation and analysis of nucleic acids, methods used in the detection and isolation of plant genes, analysis of gene expression using antibody and nucleic acid probes, mutant isolation, and methods of gene transfer to plants.

**BIOL 359 Biology of Grasses**
Fall. 3 credits. Limited to 24 students. Prerequisite: one year of introductory biology or an introductory plant taxonomy course, or permission of instructor. S-U grades optional. Offered alternate years. Not offered 1995-96; next offered fall 1997. Lecs, T R 10:10; lab, T 1:25-4:25. J. L. Davis. Systematics and ecology of the graminoid plant families (grasses, sedges, and rushes), with principal emphasis on grasses. Major topics include taxonomy, phyllogenetics, physiology, reproductive biology, ecotypic variation, speciation, biogeography, and population biology. The role of graminoids as ecosystem dominants, weeds, and the origins of cultivated species are discussed. Laboratory concentrates on the diversity of grasses.

**BIOL 441 Crop Plant Systemsatics and Evolution**
Fall. 2 credits. Prerequisite: an advanced-level course in the plant sciences with taxonomic content or permission of instructor. Offered alternate years. Not offered 1995-96. Lecs, R 12:20-2:15. D. M. Bates. An integrated study of the systematics and evolution of agronomic and horticultural species. Problems of domestication, the evolutionary history of selected cultigens, the nature of weeds and land races, classification and nomenclature as applied to cultivated plants, and underexploited plant resources are among the topics considered.

**BIOL 443 Research Methods in Systematic Botany**
Fall or spring. 2 credits. Limited to 10 students. Prerequisite: BIOPL 248 or equivalent. Offered alternate years. Not offered 1995-96. Lab, F 1:25-4:25; additional hours to be arranged. Bailey Hortorum staff. This is 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.

**BIOL 444 Plant Cell Biology**
Fall. 4 credits. Limited to 24 students. Prerequisite: one year of introductory biology or permission of instructor. Lecs, M W F 9:05; lab, M or W 1:25-4:25. R. O. Wayne. Evidence from microscopy, physiology, biochemistry, and molecular biology is used to try to unravel the living cell. The dynamics of protoplasm, membranes, and the various organelles are studied. The mechanisms of cell growth and division, the relationship of the cytoskeleton to cell shape and motility, the interaction of the living cell with its environment, and the processes that give rise to multilayered differentiated plants are investigated.

**BIOL 445 Photosynthesis**
Fall. 3 credits. Prerequisites: CHEM 104 or 208, MATH 106 or 111, and either PHYS 102 or 208 or permission of instructor. Offered alternate years. Not offered 1995-96. Lecs, M W F 10:10. C. Reiss. A detailed study of the processes by which plants use light energy to grow. Structure of the photosynthetic apparatus, light absorption and antenna processes, photochemistry, and electron transport are discussed. The course incorporates biophysical, biochemical, physiological, and molecular aspects of photosynthesis. Photosynthetic carbon metabolism is not covered in detail. Discussions include relevant material in bacterial, algal, and higher-plant photosynthesis.

**BIOL 447 Molecular Plant Systematics**
Fall. 3 credits. Prerequisites: BIOPL 248, and BIOGD 281, or written permission of instructor. Offered alternate years. Lecs, T R 8:30-9:55. J. J. Doyle. The study of variation at the molecular level and its application to taxonomy and evolution of plants, particularly angiosperms. Emphasis is on the use of molecular evidence, particularly DNA data, for reconstructing phylogenies. Theory and methods of phylogenetic reconstruction are discussed. The organization and evolution of nuclear, mitochondrial, and chloroplast genomes, genes, and gene products are described from the standpoint of their utility for addressing a diversity of evolutionary questions. These questions span the entire taxonomic spectrum, and include such issues as the origin of angiosperms, evolution of species related to important crop plants, and population studies of hybridization.

**BIOL 448 Plant Evolution and the Fossil Record**
Spring. 3 credits. Prerequisites: BIOPL 248, or equivalent, or permission of instructor. Offered alternate years. Not offered 1995-96. 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.

**BIOL 453 Principles and Practice of Historical Biogeography (also Entomology 453)**
Fall. 3 credits. Prerequisite: a course in systematics or permission of instructor. S-U grades optional. Lecs, T R 10:10; lab/disc, R 2:30-4:25. J. K. Liebherr, M. A. Luckow. This course provides a comprehensive survey of the current methods and techniques used in historical biogeography, and the development of modern biogeographic theory in the context of classical and ecological methods of analysis. Brief summaries of geological and paleontological aspects of biogeography are presented, and large-scale biogeographic patterns are discussed. The laboratories focus on hands-on computer applications of modern techniques and discussion of controversial issues in biogeography.

**BIOL 641 Laboratory in Plant Molecular Biology**
Spring. 4 credits. Prerequisites: BIOGD 281 or equivalent, or concurrent enrollment in BIOGD 331 or 333, or equivalent, and permission of instructor. S-U grades optional. Lab, T R 9:05-4:30.
A detailed study of the processes by which plants acquire and utilize mineral nutrients from the soil. Topics include the uptake, translocation, and compartmentation of mineral elements; root-soil interactions; the metabolism of mineral elements; the involvement of mineral nutrients in various physiological processes; and the nutrition of plants adapted to extreme environmental stresses (e.g., acid soils). Specific mineral elements are emphasized to illustrate these topics.

**BIOPL 642 Plant Mineral Nutrition** (also Soil, Crop, and Atmospheric Sciences 642)
Spring. 3 credits. Prerequisite: BIOPL 342 or equivalent. Offered alternate years. Not offered 1995-96. Lecs, M W F 10:10. L. V. Kochian, R. M. Welch.

An introduction to some modern methods in experimental plant biology. A partial list of techniques used includes fluorescence measurements, infrared CO\(_2\) analysis, gel electrophoresis and Western blots, cellular electrode measurements, microtiter plate technology for enzyme assays, and sensitive growth measurements, HPLC and GC-MS, and computer interfacing with laboratory equipment.

**BIOPL 643 Plant Physiology, Advanced Laboratory Techniques**
Fall. 4 credits. Prerequisites: organic chemistry, biochemistry, and a course in plant physiology. S-U grades only. Lab, T or W 8-9:50, disc. M 4:30-5:30. A. T. Jagendorf and staff.

An examination of the molecular properties of the plant genome, RNA editing, organelle transformation, expression of nuclear genes for organelle proteins. Special topics include cytoplasmic male sterility and gene regulation during plastid development.

**BIOPL 644 Plant Growth and Development**
Spring. 3 credits. Prerequisites: BIOPL 345 and either 242 or 342 or their equivalents, or written permission of instructor. S-U grades only. Lecs, M W F 9:05. P. J. Davies, D. J. Paolillo.

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 the importance of the plant environment, energy balance, gas exchange, water relations, photosynthesis, respiration, translocation, nutrient supply, and the timing of developmental events.

**BIOPL 652 Plant Molecular Biology II**
Spring. 1-5 credits (1 credit per section). Prerequisites: BIOGD 281 and BIOBM 330 or 332, or their equivalents. Recommended: BIOBM 331. S-U grades optional.

A series of four-week modules on specialized topics. Coordinator: S. H. Howell.
BIOP 653 Plant Molecular Biology I
Fall. 1–4 credits (1 credit per section).
Prerequisites: BIOGD 281 and BIOMB 330 or 332, or their equivalents. Recommended: BIOMB 331. S-U grades optional. 
A series of four-week modules on specialized topics. Coordinator: S. H. Howell.

Section 01 Concepts and Techniques in Plant Molecular Biology (also Plant Breeding 653.1)
1 credit. Lecs, M W F 10:10 (12 lecs) Sept. 6-Oct. 2. R. Wu, J. Steffins.
A review and update on molecular biology concepts relevant to plant sciences including DNA synthesis, RNA transcription and processing, and protein structure and translation. Methods applicable to plant molecular biology are described including isolation of nucleic acids, gel electrophoresis, recombinant DNA techniques, mutant production, DNA-protein interactions, and use of antibodies.

Section 02 Plant Biotechnology (also Plant Breeding 653.2 and Plant Pathology 653.3)
Applications of molecular biology and tissue culture to plant biotechnology are considered. Topics covered include gene introduction and tissue culture technologies, as well as use of cultured plant materials and transgenic plants to obtain resistance to insects, plant diseases, and herbicides, to produce useful products, and to improve nutritional and food processing qualities. Regulatory and social issues relating to plant biotechnology are discussed.

Section 03 Plant Genome Organization and Function (also Plant Breeding 653.3)
1 credit. Lecs, M W F 10:10 (12 lecs) Oct. 4-Nov. 1. S. D. Tanksley.
Molecular structure and evolution of plant nuclear genomes are explored. Topics covered include mechanisms for packaging DNA into chromosomes, molecular structure of telomeres and centromeres, DNA replication and methylation, and molecular biology of plant transposons. Methods for genetic and physical mapping of plant genomes are discussed as well as applications of mapping tools for gene isolation and plant breeding.

Section 04 Molecular Aspects of Plant Development I
1 credit. Lecs, M W F 10:10 (12 lecs) Nov. 6-Dec. 4. J. B. Nasrallah.
The module explores current approaches to the elucidation of molecular signals and signal transduction pathways as they relate to the establishment of the differentiated state of plant cells and organs. Topics include the use of classical and molecular genetics, genetic tagging methods, and transgenic plants for the study of cellular differentiation, hormonal and light responses, and cell-cell signaling.

BIOP 654 Botanical Nomenclature
Fall. 1 credit. Prerequisite: written permission of instructor. S-U grades only. Offered alternate years. Not offered 1995–96. Lec and dic to be arranged. R. P. Korf.
An analysis of the International Code of Botanical Nomenclature and its application to various plant groups.

BIOP 655 Seminar in Ethnobotany (also Anthropology 627)
Fall. 2 or 4 credits (4 credits with independent tutorial). Prerequisite: written permission of instructor for undergraduates. Lec, W 1:25; disc, W 2:30. D. M. Bates, C. R. Franqueton.
An exploration of ethnobotany, the study of the interrelationships of people and plants viewed from anthropological and botanical perspectives. Contemporary issues, theory, and methodology are considered. Topics include subsistence systems, crop domestication, traditional medicine, indigenous resource management, and preceptions of nature, among others.

BIOP 656 Topics in Paleobotany
Spring. 1 credit. Prerequisite: BIOP 448 or equivalent background in evolution, or written permission of instructor. Lab and disc to be arranged. K. J. Niklas.
A series of selected topics to provide a background in plant evolution, paleobotanical literature, and evolutionary theory. Among the topics discussed are the origin of a terrestrial flora, the evolution of the seed plants, and the origin and adaptive radiation of the angiosperms.

BIOP 740 Plant Biology Seminar
Fall and spring. No credit (no official registration). Required of graduate students doing work in plant biology. Sem, F 13:15. Staff.
Lectures on current research in plant biology, presented by visitors and staff.

BIOP 741 Problems in Plant Cell and Molecular Biology
Fall. 2 credits. Limited to first- and second-year graduate students in the Plant Cell and Molecular Biology Program. Disc to be arranged. Staff.
An introduction to the research literature in plant molecular and cellular biology through weekly problem sets and discussions.

BIOP 742 Current Topics in Plant Molecular Biology
Fall or spring. 1 credit. Limited to 20 students. Primarily for graduate students, with preference given to majors or minors in plant molecular biology; written permission of instructor required for undergraduates. S-U grades only. Sem, 1 hour each week to be arranged. Staff.
A seminar with critical presentation and discussion by students of original research papers concerning the molecular biology of plants. Staff direction varies each year and is announced a semester in advance.

BIOP 743 Current Research in Plant Cell and Molecular Biology
Fall. 1 credit. Limited to graduate students; written permission from a member of the Plant Cell and Molecular Biology Program required for undergraduates. Lec to be arranged. Staff.
An introduction for graduate students to the research being conducted by Cornell faculty in the Plant Cell and Molecular Biology Program.

BIOP 744 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 BIO G 499 but intended for graduate students who are working with faculty members on an individual basis.
The objective of the Shoals Marine Laboratory (SML) is to provide undergraduates, beginning graduate students, and other interested adults a unique opportunity to explore marine sciences in an island setting noted for its biological wealth. SML has established a national reputation for excellence and has become North America's largest marine field station focusing on undergraduate education.

The summer population of Appledore Island is limited to about one hundred people at any one time. Participants and faculty members can literally and figuratively immerse themselves in their explorations, free from distractions common to most academic institutions. Because SML is a residential facility, a sense of community develops that makes courses and seminars at SML outstanding educational and intellectual experiences. Participants learn from and exchange ideas with a wide range of specialists whose primary interest is marine but whose perspectives often differ, providing fertile ground for lively discussions.

Credit courses at Shoals Marine Laboratory are full-time, intensive learning experiences. Courses may be taken sequentially, but not concurrently. A typical day combines lecture sessions, laboratory and field work, field trips to nearby islands and the mainland, and collecting and research excursions aboard the Laboratory's 47-foot research vessel, John M. Kingsbury. Field experience is an integral component of all courses, using Appledore's extensive intertidal zone, wading bird rookeries, and seabird colonies. Faculty, drawn from Cornell University, the University of New Hampshire, and other leading academic institutions, are selected not only based on their academic excellence, but also on their teaching ability in the field. In addition, numerous guest lecturers include engineers, coastal planners, and specialists from private industry, government, and the academic community.

The Ithaca campus functions of the Shoals Marine Laboratory are centered in the Cornell Marine Programs Office, G14 Stimson Hall. The office serves as an advising center for students interested in the marine sciences, maintains a browsing library with updated information on graduate study and career opportunities as well as on marine programs at other institutions, and administers the SEA office at P.O. Box 6, Woods Hole, MA, 02543. Estimated cost (includes tuition, room and board aboard ship and on the island, and ferry transportation), $2,600. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

An exciting opportunity to explore the offshore and near-coastal environments of the Gulf of Maine for pre-college and first-year non-science majors. Students spend ten days aboard the Sea Education Association's SSV Corwith Cramer and sail from Woods Hole, MA, to the Isles of Shoals, the Gulf of Maine. Besides operating the ship, students study the many characteristics of this unique ocean environment. Following the sea component, students spend seven days at the Shoals Marine Laboratory to collect data characteristic of the Isles of Shoal's coastal environment.

**BIOSM 161 Introduction to Field Marine Science**

- **Summer. 4 credits. S-U grades optional.** A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall.
- Estimated cost (includes tuition, room and board, and ferry transportation), $1,700. Offered alternate years. Not offered 1995–96.
- This course allows students who are not biology majors to experience the breadth of the marine sciences under field conditions at an island laboratory. Areas of study include: biology, geology, earth science, chemistry, and physics are included. Specific topics include beach, salt marsh, tidal mud flat, tide pool, and benthic offshore environments; identification of marine plants and animals; chemical and physical oceanography; marine geology; and ecology of kelp beds and urchin barrens.

**BIOSM 204 Biological Illustration**

- **Summer. 2 credits. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall.**
- Estimated cost (includes tuition, room and board, supplies, and ferry transportation), $950. Daily sessions for 1 week. SML faculty.
- General discussion of scientific publishing, illustration labeling, color techniques, and printing processes. The course provides the scientist or science student a chance to experience several illustration techniques with the goal of obtaining an overview of scientific and wildlife illustrations. The student may choose a single technique to explore in depth. Course size is limited so that individual attention can be emphasized.

**BIOSM 309 Coastal Ecology and Bio­climates**

- **Summer. 2 credits. Prerequisite: one year of college-level biology; background preferred in physics/physical geography. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application consult the SML office, G14 Stimson Hall.**
- Estimated cost (includes tuition, room and board, and ferry transportation), $1,850. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.
- A study of the fundamentals of organism-environment interaction developed through defining and measuring abiotic factors including solar radiation, temperature, atmospheric moisture, precipitable wind, and currents. In-situ exploration of the dynamics of meteorology and the role of abiotic and biotic factors in the life of coastal and marine plants and animals including humans.

**BIOSM 327 Neurobiology of Animal Behavior**

- **Summer. 4 credits. Prerequisite: permission of instructor and successful performance in college-level introductory biology and chemistry courses with laboratories. Recommended: course work in neurobiology, psychology, and animal behavior. S-U grades optional. A special 2-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off the coast of Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall.**
- Estimated cost (includes tuition, room and board, and ferry transportation), $1,850. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.
- Neural mechanisms underlie all behaviors, from simple reflexes to complex social interactions. The functional elements of those mechanisms are common to both terrestrial and marine systems. The course focuses on the neural mechanisms of behavior in marine organisms, a topic that has produced significant biomedical discoveries. Students gain hands-on experience with a spectrum of modern research techniques for behavioral, neuroanatomical, computational, and molecular approaches. A visiting scientist provides information on current research on marine behavioral research scientists.

**BIOSM 329 Ecology of Animal Behavior**

- **Summer. 4 credits. Prerequisite: one year of introductory college biology. Recommended: course work in ecology, psychology, or marine 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 an application, consult the SML office, G14 Stimson Hall.**
- Estimated cost (includes tuition, room and board, and ferry transportation), $1,850. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.
- The ecological significance of behaviors of coastal organisms, with emphasis on field and laboratory research methods. Lectures and readings address the major subareas of behavior (communication, orientation, social behavior, foraging, predator avoidance, and sensory mechanisms). Each student engages in short-term behavioral observation and prepares a research proposal for studying a problem within the course subject area.

**BIOSM 363 Marine Biology for Teachers**

- **Summer. 3 or 4 credits (1-credit option: additional 4 days of research).** Primarily for teachers, grades 6 through 12, but open to others with teaching experience. Prerequisite: one year of introductory college biology. S-U grades optional. A special 10-day course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall.
- Estimated cost (includes tuition, room and board, and ferry transportation), $1,450. 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 region.

**BIOSM 364 Field Marine Science**
Summer. 6 credits. Prerequisite: one year of college biology. S-U grades optional. A special 4-week course offered twice each summer at Cornell’s Shallows Marine Laboratory (SML), on an island off Portsmouth, N.H. This course emphasizes living material in natural habitats. Most of the course work is concerned with the biology of intertidal plants and animals, biological oceanography, ichthyology, and fisheries. Attention is given to introductory physical and chemical oceanography and marine geology. Marine ecology and the effects of human activity on the marine environment are included. Students apply this knowledge by conducting an ocean research cruise toward the end of the course.

**BIOSM 365 Underwater Research**
Summer. 4 credits. Prerequisites: one year of college-level biology, recognized scuba certification, and a medical examination. S-U grades optional. A special 2-week course offered at Cornell’s Shallows Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Simson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $2,850. Daily labs, labs, and fieldwork for 2 weeks. Students are required to conduct an ocean research project aboard the ship of the SML. Fieldtrip members assisted by up to 15 visiting lecturers, including representatives of governmental agencies. SML faculty.

**BIOSM 366 SEA Introduction to Oceanography**
3 credits. Prerequisite: concurrent enrollment in BIOSM 367 and 368. A survey of the characteristics and processes of the global ocean. Oceanographic concepts are introduced and developed from their bases in physics, chemistry, and biology, with a particular emphasis on physical oceanography. In this rapidly evolving field, students develop individual projects to be carried out at sea.

**BIOSM 367 SEA Introduction to Maritime Studies**
3 credits. Prerequisite: concurrent enrollment in BIOSM 367 and 368. An interdisciplinary consideration of our relationship with the marine environment. Covers the elements of maritime history, law, literature, and art necessary to appreciate our marine heritage and to understand the political and economic problems of contemporary maritime affairs.

**BIOSM 368 SEA Introduction to Nautical Science**
3 credits. Prerequisites: concurrent enrollment in BIOSM 366 and 367. An introduction to the technologies of navigation at sea. The concepts of navigation (piloting, celestial, and electronic), naval architecture, ship construction, marine engineering systems, and the physics of sail are taught from their bases in astronomy, mathematics, and physics. Provides a theoretical foundation for the navigation, seamanship, and engineering that students employ at sea.

**Sea Component (six weeks)**
Courses 369 and 370 take place aboard the R/V Winstead, a 125-foot steel auxiliary-powdered staysail schooner built in 1961, or the R/V Corwith Cramer, a 134-foot steel auxiliary-powdered brigantine built in 1987 for SEA. Both ships normally put to sea with a ship’s company of thirty-four. The professional staff of nine includes the captain, the chief scientist, three science watch officers, three deck watch officers, an engineer, and a steward. In addition, one or more visiting investigators are frequently aboard. Each student is ultimately responsible directly to the chief scientist and the master of the vessel for the safe and orderly conduct of research activities and related operations of the vessel. Each student undertakes an individual research project designed during the shore component.

**BIOSM 369 SEA Practical Oceanography**
4 credits. Prerequisite: BIOSM 366. Theories and problems raised in the shore component are addressed in the practice of oceanography at sea. Students are introduced to the tools and techniques of the practicing oceanographer. During lectures and watch standing, students are instructed in the operation of basic oceanographic equipment, in the methodologies involved in the collection, reduction, and analysis of oceanographic data; and in the attendant operations of a sailing oceanographic research vessel.

**BIOSM 370 SEA Practical Oceanography II**
4 credits. Prerequisites: BIOSM 368 and 369. Building on the experience of Practical Oceanography I, students assume increasing responsibility for conducting oceanographic research and overseeing operations of the vessel. The individual student is ultimately responsible directly to the chief scientist and the master of the vessel for the safe and orderly conduct of research activities and related operations of the vessel. Each student undertakes an individual research project designed during the shore component.

**BIOSM 372 SEA Practical Oceanography III**
Summer. 3 credits. Prerequisites: BIOSM 366, 367, and 368. Theories and problems raised in class are tested in the practice of oceanography at sea. During lectures and watch standing, students are instructed in the operation of basic oceanographic equipment, in the methodologies involved in the collection, analysis, and reduction of oceanographic data; and in the attendant operations of a sailing oceanographic research vessel. Group research projects are completed.

**BIOSM 402 Marine Pollution**
Summer. 4 credits. Prerequisite: one year of college-level biology and chemistry or permission of instructor. S-U grades optional. A special 1-week course offered at Cornell’s Shallows Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Simson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $1,850. Daily labs, labs, and fieldwork for 2 weeks. SML faculty.

Dispersion modeling and the effects of pollutants (including oil, effluents, solid wastes, sludge and dredge spoils, and radioactive wastes) are discussed from the perspectives of elementary physical oceanography and biological processes. Laboratories include basic methods for targeting and tracing wastewater, organic carbon determinations, and practical field projects.

**BIOSM 409 Clilorophyll**
Summer. 2 credits. Prerequisite: permission of instructor. A special 1-week course offered at Cornell’s Shallows Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Simson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $950. Daily labs and lab work for 1 week. SML faculty.

A special course that examines chlorophyll biology in depth through lectures and laboratory exercises. Topics include a detailed look at the chlorophyll found in such diverse habitats as salt marshes, sandy
BIOL 413 Adaptations of Marine Organisms
Summer. 6 credits. Prerequisite: BIOM 364 or permission of instructor. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $2,500. Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.

BIOSM 449 Marine Botany: Ecology of Marine Plants
Summer. 4 credits. Prerequisite: BIOM 364 or one year of introductory 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 an application, consult the SML office, G14 Stimson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $1,850. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

BIOSM 477 Marine Vertebrates
Summer. 6 credits. Prerequisite: permission of instructor and a course in vertebrate biology. S-U grades optional. A special 3-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $2,500. Daily lecs, labs, and fieldwork for 3 weeks. SML faculty.

BIOL 490 Marine Botany: Ecology of Marine Plants
Summer. 4 credits. Prerequisite: BIOM 364 or one year of introductory 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 an application, consult the SML office, G14 Stimson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $1,850. Daily lecs, labs, and fieldwork for 2 weeks. SML faculty.

NTRES Coastal and Oceanic Law and Policy (Natural Resources 306)
Summer. 2 credits. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML) on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $950. Daily lecs and disc for 1 week. SML faculty.

NTRES Wetland Resources (Natural Resources 417)
Summer. 2 credits. Prerequisite: one year of college-level biology. A special 1-week course offered at Cornell's Shoals Marine Laboratory (SML), on an island off Portsmouth, N.H. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost includes tuition, room and board, and ferry transportation, $950. Daily lecs, labs, and fieldwork for 1 week. SML faculty.

FACULTY ROSTER

New York State College of Agriculture and Life Sciences
Adler, Kraig K., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
Alder, Eric E., Ph.D., Harvard U. Asst. Prof., Genetics and Development
Anderson, John M., Ph.D., New York U. Prof., Emeritus, Genetics and Development
Howarth, Robert W., Ph.D., Massachusetts Inst. of Technology. Prof., Biochemistry, Molecular and Cell Biology

Uhl, Charles H., Ph.D., Cornell U. Prof. Emeritus, Philosophy

Uhl, Natalie W., Ph.D., Cornell U. Prof. Emeritus, Bailey Hortorum

Vogt, Volker M., Ph.D., Harvard U. Prof., Biochemistry, Molecular and Cell Biology

Walcott, Charles, Ph.D., Cornell U. Prof., Neurobiology and Behavior/Laboratory of Ornithology

Wayne, Randy O., Ph.D., U. of Massachusetts. Assoc. Prof., Plant Biology

Winans, Stephen C., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Microbiology

Winkler, David W., Ph.D., U. of California at Berkeley. Assoc. Prof., Ecology and Systematics

Wu, Ray, Ph.D., U. of Pennsylvania. Prof., Biochemistry, Molecular and Cell Biology

Zahler, Stanley A., Ph.D., U. of Chicago. Prof. Emeritus, Genetics and Development

Zinder, Stephen H., Ph.D., U. of Wisconsin. Prof., Microbiology

Other Teaching Personnel

Blankenship, James E., M.S., Cornell U. Lecturer, Biochemistry, Molecular and Cell Biology

Calvo, Ria A., Ph.D., Cornell U. Sr. Lecturer, Genetics and Development

Cordts, Marcia L., Ph.D., Cornell U. Lecturer, Microbiology

Ecklund, P. Richard, Ph.D., Oregon State U. Sr. Lecturer, Neurobiology and Behavior

Gleas, Joan C., Ph.D., Cornell U. Sr. Lecturer, Neurobiology and Behavior

Griffiths, Joan M., Ph.D., Cornell U. Lecturer, Genetics, Molecular and Cell Biology

Heiser, John B., Ph.D., Cornell U. Sr. Lecturer, Ecology and Systematics

McFadden, Carol H., Ph.D., Cornell U. Sr. Lecturer, Physiology

Merkel, Susan M., Cornell U. Lecturer, Microbiology

Rehkov, Sarah M. E., Cornell U. Sr. Lecturer, Microbiology

Tyler, Bonnie M., Ph.D., Massachusetts Inst. of Technology. Lecturer, Biochemistry, Molecular and Cell Biology

Joint Appointees

Bloom, Stephen E., Assoc. Prof., Poultry and Avian Sciences/Biological Sciences

Borr, Arthur C., Adjunct Prof., U. of New Hampshire/Biological Sciences

Butler, Walter R., Assoc. Prof., Animal Science/Physiology

Flecker, Alexander S., Adjunct Asst. Prof., Center for the Environment/Ecology and Systematics

Foote, Robert H., Jacob Gould Schurman Prof. Emeritus, Animal Science/Physiology

Greene, Charles H., Adjunct Assoc. Prof., Center for the Environment/Ecology and Systematics

Howell, Stephen H., Adjunct Prof., Boyce Thompson Institute/Plant Biology

Kochian, Leon V., Adjunct Assoc. Prof., USDA Science and Education Administration/Plant Biology

Koif, Richard P., Prof., Plant Pathology/Bailey Hortorum

LaRue, Thomas A., Adjunct Prof., Boyce Thompson Institute/Plant Biology

Last, Robert L., Adjunct Assoc. Prof., Boyce Thompson Institute/Genetics and Development
Huffaker, Tim C., Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Biochemistry, Molecular and Cell Biology
Karplus, P. Andrew, Ph.D., U. of Washington. Assoc. Prof., Biochemistry, Molecular and Cell Biology
Kennedy, Kenneth A. R., Ph.D., U. of California at Berkeley. Prof., Ecology and Systematics
Leonard, Samuel L., Ph.D., U. of Wisconsin. Prof., Emeritus, Genetics and Development
McDonald, June M. Fessenden, Ph.D., Tufts U. Assoc. Prof., Biochemistry, Molecular and Cell Biology/Program on Science, Technology, and Society
Mcclearn, Deedra K., Ph.D., Harvard U. Asst. Prof., Ecology and Systematics
McCobb, David, Ph.D., U. of Iowa. Asst. Prof., Neurobiology and Behavior
McFarland, William N., Ph.D., U. of California at Los Angeles. Prof. Emeritus, Ecology and Systematics
Nicholson, Linda, Ph.D., Florida State U. Asst. Prof., Biochemistry, Molecular and Cell Biology
Podleski, Thomas R., Ph.D., Columbia U. Prof., Neurobiology and Behavior/Physiology
Provine, William B., Ph.D., U. of Chicago. Charles Alexander Professor of Biological Sciences, Ecology and Systematics/History
Salpeter, Miriam M., Ph.D., Cornell U. Prof., Neurobiology and Behavior/Applied and Engineering Physics
Scheidegger, Anne M., Ph.D., Harvard U. Asst. Prof., Neurobiology and Behavior
Seeley, Thomas D., Ph.D., Harvard U. Prof., Neurobiology and Behavior
Sherman, Paul W., Ph.D., U. of Michigan. Prof., Neurobiology and Behavior
Turgeon, Robert, Ph.D., Carleton U. (Canada). Assoc. Prof., Plant Biology
Wallace, Bruce, Ph.D., Columbia U. Prof., Emeritus, Genetics and Development/Washington, David B., Ph.D., Stanford U. Prof., Biochemistry, Molecular and Cell Biology
Wolfner, Mariana F., Ph.D., Stanford U. Prof., Genetics and Development

Other Teaching Personnel
Albrecht, Genia S., Ph.D., U. of Washington. Sr. Lecturer, Biochemistry, Molecular and Cell Biology
Eberhard, Carolyn, Ph.D., Boston U. Sr. Lecturer, Plant Biology
Johnson, Bruce R., Ph.D., Boston U. Sr. Lecturer, Neurobiology and Behavior

Joint Appointees
Adkins-Regan, Elizabeth, Prof., Psychology/Neurobiology and Behavior
Levin, Simon A., Adjunct Prof., Princeton U./Ecology and Systematics
Lewin, Gene E., Adjunct Prof., Institute of Ecosystem Studies/Ecology and Systematics

New York State College of Veterinary Medicine
Fortune, Joanne E., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology
Gasteiger, Edgar L., Ph.D., U. of Minnesota. Prof. Emeritus, Physiology
Gilmour, Robert F., Ph.D., SUNY Upstate Medical Center. Assoc. Prof., Physiology

Hansel, William, Ph.D., Cornell U. Liberty Hyde Bailey Prof. Emeritus, Physiology
Hengen, Frederick W., Ph.D., U. of Wisconsin at Madison. Prof. Emeritus, Physiology/Veterinary Physiology
Robertsaw, David, Ph.D., Glasgow U. (Scotland). Prof., Physiology/Veterinary Physiology
Wasserman, Robert H., Ph.D., Cornell U. Prof., Physiology/Veterinary Physiology/Nutritional Sciences†

Other Teaching Personnel
Concannon, Patrick W., Ph.D., Cornell U. Sr. Lecturer, Physiology

Joint Appointees
Dobson, Alan, Prof., Veterinary Physiology/Physiology
Houp, Katherine A., Prof., Veterinary Physiology/Physiology
Houp, T. Richard, Prof., Veterinary Physiology/Physiology
Nathaniszt, Peter W., Leading Prof., Clinical Sciences/Veterinary Physiology
Sellers, Alvin F., Prof. Emeritus, Veterinary Physiology/Physiology
Wooton, John F., Prof., Veterinary Physiology/Physiology

Division of Biological Sciences
Stinson, Harry T., Jr., Ph.D., Indiana U. Prof., Biological Sciences/Genetics and Development*†

Division of Nutritional Sciences
Joint Appointees
Arion, William J., Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Bensadoun, Andre, Prof., Nutritional Sciences/Physiology
Kazarianoff, Michael N., Assoc. Prof., Nutritional Sciences/Biochemistry, Molecular and Cell Biology
Wright, Lemuel D., Ph.D., Oregon State Coll. Prof. Emeritus, 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.
ADMINISTRATION
John E. Hopcroft, dean
Michael S. Isaacson, associate dean for research and graduate studies
Gerald Rehakler, associate dean for undergraduate programs
Mark K. Spiro, associate dean for administration
Deborah Cox, assistant dean for student services
Murray Deathe, assistant dean for development and alumni relations

FACILITIES AND SPECIAL PROGRAMS
Most of the academic units of the College of Engineering are on the Joseph N. Pew, Jr. Engineering Quadrangle. Facilities for applied and engineering physics are located in Clark Hall on the College of Arts and Sciences campus, and facilities for agricultural and biological engineering are centered in Riley-Robb Hall on the campus of the New York State College of Agriculture and Life Sciences.

Special university and college facilities augment the laboratories operated by the various engineering schools and departments, and special centers and programs contribute to opportunities for study and research.

Computing equipment, for example, is widely available through centers administered by the university and by the College of Engineering, as well as in laboratories run by schools, departments, or programs. The university facilities include personal computers for student use, terminals connected to the mainframe, computer-graphics equipment, and a supercomputer. The College of Engineering operates, in addition to several computing centers for student use, a workstation facility, which provides advanced computer-graphics equipment used in course work throughout the college.

Cornell programs and centers of special interest in engineering include the following:

Center for Applied Mathematics A cross-disciplinary center that administers a graduate program.
Center for the Environment A sponsor of interdisciplinary programs that are currently in the areas of environmental law and policy, ecosystem research, remote sensing, water resources, the global environment, biological resources, waste management, and solid-waste combustion.
Center for Radiophysics and Space Research An interdisciplinary unit that facilitates research in astronomy and the space sciences.
Center for Theory and Simulation in Science and Engineering A national supercomputer facility used for advanced research in engineering and the physical and biological sciences.

Cornell Electronic Packaging Alliance A cooperative venture involving Cornell and several corporations in the areas of computing and microelectronics, organized to undertake precompetitive, interdisciplinary research in electronic packaging.

Cornell High Energy Synchrotron Source (CHESS). A high-energy synchrotron radiation laboratory operated in conjunction with the university's high-energy storage ring. Current research programs at CHESS are in areas of structural biology, chemistry, materials science, and physics.

Center for Manufacturing Enterprise A joint venture of Cornell, industrial organizations, and the federal government to encourage the development and implementation of modern manufacturing systems.

Cornell Program in Power Systems Engineering A research and instructional program centered in a laboratory that has a complete real-time model of an electric power system.

Cornell Waste Management Institute A research, teaching, and extension program within the Center for Environmental Research that addresses the environmental, technical, and economic issues associated with solid waste; one facility sponsored by the institute is the Combustion Simulation Laboratory in the Sibley School of Mechanical and Aerospace Engineering.

Institute for the Study of the Continents An interdisciplinary organization that promotes research on the structure, composition, and evolution of the continents.

Laboratory of Plasma Studies A center for interdisciplinary research in plasma physics and lasers.

Materials Science Center An interdisciplinary facility with substantial support from the National Science Foundation, providing sophisticated equipment.

Mathematical Sciences Institute An interdisciplinary program in applications of mathematics funded by the U.S. Army.

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

National Earthquake Engineering Research Center A facility recently established by the National Science Foundation at a group of universities in New York State to study response and design of structures in earthquake environments.

National Institutes of Health/National Science Foundation Developmental Resource in Biophysical Imaging and Optoelectronics A resource that develops novel measurement and optical instrumentation for solving biophysical problems.

National Nanofabrication Facility A center that provides equipment and services for research in the science, engineering, and technology of structures (for electronic, chemical, physical, and biological applications) with dimensions as small as nanometers.

Program of Computer Graphics An interdisciplinary research center that operates one of the most advanced computer graphics laboratories in the United States.

Program on Science, Technology, and Society A cross-disciplinary unit that sponsors courses and promotes research on the interaction of science, technology, and society.

SRC Center for the Program on Microscience and Technology A center sponsored by the Semiconductor Research Corporation to promote research essential to the development of VLSI devices and circuits.

Statistics Center Coordinates a university-wide program in statistics and probability.

Ward Laboratory of Nuclear Engineering Irradiation, isotope production, and activation analysis facilities for interdisciplinary research.

Programs sponsored by College of Engineering units include several for industrial affiliates. These are in the areas of injection molding, computer science, materials science, geologic study of the continents, and nanometer scale structures.

DEGREE PROGRAMS
Cornell programs in engineering and applied science lead to the degrees of Bachelor of Science, Master of Engineering (with field designation), Master of Science, and Doctor of Philosophy.

General academic information concerning the Bachelor of Science degree is given here under the heading "Undergraduate Study." Curricula for major studies are described under the various academic areas.

Programs leading to the Master of Science and Doctor of Philosophy degrees are administered by the Graduate School. They are described in the "Announcement of the Graduate School" and the special announcement "Graduate Study in Engineering and Applied Science." The professional Master of Engineering programs and cooperative programs with the Johnson Graduate School of Management are described below.

UNDERGRADUATE STUDY
Bachelor of Science (B.S.) degrees are offered in the following areas:

Agricultural and biological engineering
Chemical engineering
Civil engineering
College program
Computer science
Electrical engineering
Engineering physics
Geological sciences  
Materials science and engineering  
Mechanical engineering  
Operations research and engineering  

Students in the College of Engineering begin their undergraduate studies in the Common Curriculum, which is administered by the faculty members of the College Curriculum Governing Board (CCGB) through the associate dean for undergraduate programs and the Engineering Advising office. Subsequently most students enter field programs, which are described separately for each academic area. Criteria for entrance into the field programs are described in the section titled "Affiliation with a Field Program." Alternatively students may enter the College Program (described below), which permits them to pursue a course of study adapted to individual interests.

Students interested in bioengineering may arrange a suitable curriculum with a bioengineering option within one of the field programs or through the College Program. Information about the bioengineering option is available in the Engineering Advising office, 167 Olin Hall. Students interested in environmental engineering may pursue the environmental option offered by the School of Civil and Environmental Engineering.

*Agricultural and biological engineering, chemical engineering, civil engineering, electrical engineering, engineering physics, materials science and engineering, mechanical engineering, and operations research and engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

**To major in agricultural and biological engineering students normally 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. However, students enrolled in the College of Engineering for the first two years may affiliate with the field of agricultural and biological engineering and become jointly enrolled in the Colleges of Agriculture and Life Sciences and Engineering for the third and fourth years.

### Requirements for Graduation

To receive the Bachelor of Science degree, students must meet the requirements of the Common Curriculum, as set forth by the College of Engineering, including the requirements of the field program, as established by the school or department with which they become affiliated. Students entering the college in the Class of 1998 or later must meet the Common Curriculum as explained below. (Further explanation of the revised Common Curriculum and field flow charts are provided in the 1995-96 edition of the Engineering Undergraduate Handbook.)

<table>
<thead>
<tr>
<th>Course Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Mathematics</td>
<td>16</td>
</tr>
<tr>
<td>2) Physics</td>
<td>8-12</td>
</tr>
<tr>
<td>3) Chemistry</td>
<td>4-8</td>
</tr>
<tr>
<td>4) Freshman writing seminar*</td>
<td>6</td>
</tr>
<tr>
<td>5) Computer programming†</td>
<td>4</td>
</tr>
</tbody>
</table>

### 6) Engineering distribution (3 courses)

a. One Introduction to Engineering (ENGRD) 3
b. Two other distribution courses (ENGRD) 6

### 7) Liberal studies distribution (6 courses) 18

### 8) Approved electives 6

### 9) Field program

a. Field required courses 30 cr. min.
b. Field approved electives 9
c. Courses outside the field 9

*One writing-intensive technical course or a course in technical or scientific writing must also be taken; this course may simultaneously satisfy some other requirement.

†One approved course in computing applications must also be taken; this course may simultaneously satisfy some other requirement, such as an engineering distribution course, an approved elective, or a field program course.

From 123 to 129 credit hours are required for graduation; the specific number of required credit hours will vary depending on which field program is chosen. (See field curricula for specific field requirements.) Two terms of physical education must be taken in the freshman year and students must meet the swimming requirement to satisfy a university requirement.

### Mathematics

The normal program in mathematics includes Mathematics 191, 192, 293, and 294. Every student must attain a grade of at least C- in Mathematics 191, 192, 293, and 294, or other courses that may be approved as substitutes for these courses. If this requirement is not met the first time a course is taken, the course must be repeated immediately and a satisfactory grade attained before the next course in the sequence may be taken. Courses that are taken a second time in order to meet this requirement do not yield additional credit toward a degree.

### Physics

The normal program in physics includes Physics 112, 213, and 214 or the corresponding honors courses (Physics 116, 217, and 218). Engineering students are required to have attained a minimum grade of C- in Mathematics 191 or equivalent before taking Physics 112. The same minimum grade is required in each subsequent mathematics course before taking the physics course for which it is a prerequisite (e.g., C- in Mathematics 192 before taking Physics 213, or C- in Mathematics 293 before taking Physics 214). Students in the field programs of ABEN, Chem, CEE (environmental track), or OR&IE may substitute Chemistry 208 for Physics 214.

### Chemistry

Chemistry 211 or 207 is required for all students.

Chemistry 211 is a course designed for students who do not intend any further study in chemistry and may be taken either in the fall or spring of the freshman year.

In general, students intending to affiliate with the following departments and schools should take Chemistry 211: electrical engineering, operations research and industrial engineering, computer science, mechanical and aerospace engineering, applied and engineering physics (applied and engineering physics students should discuss this option with their field consultant), and civil engineering (not students in the environmental engineering option).

Students in chemical engineering must take Chemistry 207 in the fall of their freshman year, to be followed by Chemistry 208 in the spring term. All students considering environmental engineering, materials science and engineering, geological sciences, or a health-related career such as medicine should take Chemistry 207.

### Freshman Writing Seminars

Each semester of their freshman year, students choose a freshman writing seminar from among more than seventy courses offered by over twenty different departments in the humanities, social sciences, and expressive arts. These courses offer the student practice in writing English prose. They also assure beginning students the benefits of a small class.

### Technical Writing

In addition to the two Freshman Writing Seminars required, engineering students must take a course that includes a significant amount of technical and scientific writing. This course may be used to satisfy another graduation requirement. A student can fulfill the technical writing requirement by enrolling in an engineering course specifically designed to include a writing-intensive component or by taking a course in technical or scientific writing. Courses that currently satisfy this requirement are A&EP 264, CHEM E 432, COMM 352*, COMM 360*, COMM 363*, COMM 369*, ENGRD 350, ENGRD 435, M&E 427, MS&E 435, and MS&E 443-444 if both courses are taken. Students participating in the Engineering Cooperative Program may also arrange for a writing-intensive co-op experience to satisfy this requirement. Additional courses are being reviewed. Updated information on these approved courses may be obtained from Engineering Advising, 167 Olin Hall.

*Note that there is limited enrollment in all Communications Department writing courses.

### Computing

In either the first or second term of their freshman year, students normally take COM S 100, Introduction to Computer Programming. Before graduation they must take an additional course with a significant amount of computing applications; this course may also be used to meet another graduation requirement. Courses that satisfy this requirement are ABEN 475, COM S 212, ENGRD 211 or 212, ENGRD 222, ENGRD 241, ENGRD 264, ELE E 423, M&E 389, M&E 489, M&E 575, M&E 578, and M&E 670. The recommended choice for students intending to enter the Field Program in Engineering Physics is ENGRD 264; in Chemical Engineering, ENGRD 222 or 241; in Computer Science, ENGRD 211 or COM S 212; in Electrical Engineering, ENGRD 211; in Civil Engineering, ENGRD 241; in Mechanical Engineering, M&E 389, M&E 489, M&E 575, or M&E 670; and in Operations Research and Engineering, ENGRD 211.
Engineering Distribution

Three engineering distribution courses (9 credits) are required. One course must be an Introduction to Engineering Course (designated by ENGRD). The Introduction to Engineering course will introduce students to the engineering process and provide a substantive experience in an open-ended problem-solving context. See the Introduction to Engineering Course listing for currently offered courses.

The other two distribution courses must be selected from two different categories listed below. A student may use any one of the possible substitutions described.

1) Scientific computing

ENGRD 211, Computers and Programming
ENGRD 212, Modes of Algorithmic Expression
ENGRD 222, Introduction to Scientific Computing
ENGRD 241, Engineering Computation

2) Materials science

ENGRD 261, Introduction to Mechanical Properties of Materials
ENGRD 262, Introduction to Electrical Properties of Materials

3) Mechanics

ENGRD 202, Mechanics of Solids
ENGRD 203, Dynamics

Students in the Field Program in Engineering Physics may substitute AREP 333 for ENGRD 203.

4) Probability and statistics

ENGRD 270, Basic Engineering Probability and Statistics

Students in the Field Program in Electrical Engineering may substitute ELE E 310 for ENGRD 270. Students in the Field Program in Engineering Physics may substitute ELE E 310 or Mathematics 471 for ENGRD 270. Students in the Field Programs in Civil Engineering and Agricultural and Biological Engineering may substitute CEE 304 for ENGRD 270.

5) Electrical sciences

ENGRD 210, Introduction to Electrical Systems
ENGRD 230, Introduction to Digital Systems
ENGRD 264, Computerized-Instrumentation Design

6) Thermodynamics and energy balances

ENGRD 219, Mass and Energy Balances
ENGRD 221, Thermodynamics

7) Earth and life sciences

ENGRD 201, Introduction to the Physics and Chemistry of the Earth

8) Biology and chemistry

BIO S 101 and 103, Biological Sciences, Lecture and Laboratory
BIO S 105, Introductory Biology
BIO S 107, General Biology (summer only)

CHEM 389, Physical Chemistry I

Some fields require a specific engineering distribution course as a prerequisite for the upperclass course sequence. These requirements are:

Chemical Engineering: ENGRD 219
Civil Engineering: ENGRD 202, and ENGRD 219 (or environmental option)

Computer Science: ENGRD 211 or ENGRD 212

Electrical Engineering: ENGRD 230

Materials Science and Engineering: ENGRD 261 or 262

Mechanical Engineering: ENGRD 202

Operations Research and Engineering: ENGRD 270

Liberal Studies Distribution

The six required liberal studies courses (totaling at least 18 credits) may be chosen from approved courses in four categories:

(a) humanities or history,
(b) social sciences,
(c) foreign languages, and
(d) expressive arts.

At least two courses must be chosen from category (a). No more than 3 credits toward this requirement may be taken in category (d). At least two courses in categories (a) or (b) must be from the same field of study. One of these courses must be at or above the 200-level or be an explicit prerequisite of the other.

No freshman seminar may be used to meet the liberal studies requirement.

Following each category is a list of approved courses. Every effort has been made to keep the lists up to date, but errors sometimes occur. Students who wish to use a course that seems to fit the category description but is not listed should contact the Engineering Advising Office.

a) Humanities or History

Architecture 181, 182

Art 317, 318


Archeology (courses in Old World Archeology and 493)

Asian Studies (courses in Asian art, literature, religion or cultural history)

Classics (all courses except 285, 356, 360, 361 and language courses)


Engineering 360

Government (all courses)

Human Development and Family Studies (all courses)

Human Service Studies (all courses)

International and Comparative Labor Relations (all courses)

Labor Economics (all courses)

Linguistics (all courses)

Natural Resources 201

Organizational Behavior (all courses)


Rural Sociology (all courses)

Sociology (all courses)

Textiles and Apparel 245


Music (only introductory, music theory, and music history courses)

Natural Resources 407

Near Eastern Studies (courses listed under history, civilization, or literature)

Philosophy (all courses except courses in logic)

Religious Studies 101

Russian Literature (all courses)

Spanish Literature (all courses)

Theater Arts (only courses in Theater Studies, film analysis and history)

Women's Studies 227, 238, 273, 307, 336, 357, 426

b) Social Sciences

Africana Studies 171, 172, 190, 191, 231, 280, 290, 301, 302, 344, 345, 356, 352, 382, 400, 410, 420, 451, 460, 481, 484, 485, 495

Agricultural Economics 100, 252, 332, 430, 431, 450, 464, 492

Anthropology (all courses except 101 and courses in Biological and Ecological Anthropology)

Archeology (all courses except those in Methodology and Technology)

Architecture 342

City and Regional Planning 100, 101, 218, 261, 314, 382, 404

Collective Bargaining, Labor Law and Labor History 384

Communication 116, 320, 314, 416

Consumer Economics and Housing (110, 111, 247, and any course having one or more of these as a prerequisite)

Design and Environmental Analysis 150, 250

Economics (all courses except 105, 315, 317, 303, 319, 320, 326. Engineering students should generally take Economics 203-204 and not 101-102, unless they have had no calculus.)

Education 210, 211, 212, 271, 310, 311, 317, 321, 322, 360, 378, 477

Emergency 360

Government (all courses)

Human Development and Family Studies (all courses)

Human Service Studies (all courses)

International and Comparative Labor Relations (all courses)

Labor Economics (all courses)

Linguistics (all courses)

Natural Resources 201

Organizational Behavior (all courses)


Rural Sociology (all courses)

Sociology (all courses)

Textiles and Apparel 245

c) Foreign Language
This category includes all foreign language courses, if two or more foreign language courses are used to fulfill part of the liberal studies requirement, then they must be a sequence of courses in the same language. The rules for placement and advanced placement credit in languages are those of the College of Arts and Sciences. Speakers of languages other than English may obtain up to 6 advanced placement credits according to these rules.

d) Expressive Arts
Africana Studies 303, 425, 430
Art (studio courses)
Biological Sciences 208, 209
Communications (all courses)
Design and Environmental Analysis 101, 102, 114
Engineering (all Engineering Communications courses, which are designated ENGRC)
English (expository and creative writing courses, whose numbers end in the 80's, e.g., 288, 289, 382, etc.)
Floriculture (courses in Freehand Drawing and Scientific Illustration)
Industrial and Labor Relations 452
Music (courses in musical performance and musical organizations and ensembles)
Theater Arts (all courses except those listed in category (a) above)

Electives
Six credits of approved electives are required. Approved electives can help develop the skills of a broadly educated engineer, so students should give serious thought to their educational objectives and not propose approved-elective courses haphazardly. Advisers generally accept as approved electives: one introduction to engineering course, engineering distribution courses, courses stressing oral or written communication, upper-level engineering courses, advanced courses in mathematics, and rigorous courses in the biological and physical sciences. Courses in business, economics, and language are often approved by advisers when they serve a student's educational and academic objectives. In other cases, the student's interests are better served by approved electives that expand the field program or other parts of the curriculum, including the humanities and social sciences requirement.*

In addition, nine credits of electives are determined by field approval. These electives are designated by the field program faculty and the field program faculty advisers. These electives are a part of a coordinated field curriculum, and students should refer to the Field Program curricula for descriptions of the field approved electives.

To ensure breadth of engineering studies, field programs also will include nine hours of courses outside the major.

Students are encouraged to take as many courses offered at the university in addition to the minimum engineering curriculum requirement as they wish.

*No ROTC courses may be used as approved electives unless they are co-listed by an academic department.

Social Issues of Technology
It is important for engineers to realize the social and ethical implications of their work. Consequently, in selecting their humanities, social sciences, approved electives, and free electives, students are urged to consider courses listed within the "Science, Technology, and Society" undergraduate area of concentration (see Interdisciplinary Centers and Programs section). These courses may provide students with an important perspective on their studies and their future careers.

Engineering Advising Office
From the time that students enter the college as freshmen, they apply for a affiliation with a major field or the College Program during the fall term of the sophomore year, they are under the administration of the Engineering Advising office, which implements the academic policies of the College Curriculum Governing Board. The office also offers general advising and counseling services, publishes a college newsletter, and serves as the primary resource center for undergraduate students in the college. The Engineering Minority Programs office and the Women's Programs in Engineering office provide additional specialized services.

Freshman Year
At the end of the freshman year, students are expected to have completed or received credit for at least eight courses, including Math 191, Math 192, Chemistry 211 or 207, Physics 112, COM S 100, two terms of Freshman Writing Seminars, and an Introduction to Engineering course. In addition, students need to complete two terms of physical education during their first year. *Many variations in the freshman schedule are possible, depending on the individual student's background, advanced placement credit, and career goals. Those receiving advanced placement for first term calculus may take Physics 112 in term one. Students with an interest in bioengineering may take biology in terms one and two as approved electives. Students preparing to study medicine should take one year of biology and Chemistry 207 and 208 in the first year.*

Affiliation with a Field Program
Students must apply for affiliation with a field program during the first term of their sophomore year. This is done by going to the undergraduate field consultant's office in the field of their choice and completing the "Application for Field Affiliation" form. To affiliate with a field program, students must (1) have a 2.0 cumulative grade point average and (2) have satisfied the field's course and grade requirements as specified below:

Field Program Courses and Minimum Grade Requirements
Agricultural and Biological Engineering
Applied and Engineering Physics
2.7 GPA in all mathematics and physics courses
Chemical Engineering
No more than one grade below C- in chemistry, mathematics, physics, or chemical engineering courses and a 2.2 GPA in mathematics, sciences, and chemical engineering courses
Civil & Environmental Engineering
A grade of C- in ENGRD 202 and a 2.0 GPA in all engineering and science courses
Computer Science
A grade of B- in COM S 280, ENGRD 211 or 212 and all mathematics courses
Electrical Engineering
A grade of C or better in all 200-level mathematics and physics courses
Geological Sciences
Passing grades in required field courses
Material Sciences & Engineering
A grade of C in ENGRD 261 or 262
Mechanical & Aerospace Engineering
Operations Research
A grade of C- in Math and Engineering

Students must be affiliated or conditionally affiliated by the end of their fourth semester or they will be withdrawn from the College of Engineering, unless allowed to participate in a terminal semester.

Special Programs
College Program
Individually arranged courses of study under the College Program are possible for those well-qualified students whose educational objectives cannot be met by one of the regular field programs. Often the desired curriculum is in an interdisciplinary area. Each program is developed by the student in consultation with faculty advisers and must be approved by the College Program Committee, which is responsible for supervising the student's work.

Students apply to enter the College Program by the end of the first term of the sophomore year. A student should seek assistance in developing a coherent program from professors in the proposed major and minor subject areas. If approved, the program is the curricular contract to which the student must adhere. Normally, students applying to the College Program should have a 3.0 cumulative grade point average.

Every curriculum in the College Program, with the exception of certain faculty-sponsored programs, must comprise an engineering major and an educationally related minor. The major may be in any subject area offered by schools or departments of the college; the minor may be in a second engineering subject area or in a logically connected non-engineering 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 48 credits
in the major and minor subjects, including at least 32 credits in engineering courses, each program includes the normally required courses in humanities and social sciences and approved electives.

Further information about the College Program may be obtained from the associate dean for undergraduate programs, 221 Carpenter Hall.

**College Program in the Science of Earth Systems**

A new curriculum in the Science of Earth Systems highlights study of the Earth as one of the outstanding intellectual challenges in modern science and as the necessary foundation for the future management of our home planet. The curriculum coalesces Cornell's strengths across a broad range of earth and environmental sciences to provide students with a rigorous scientific foundation for the study of our complex, highly interactive earth. Students in the College of Engineering can take this curriculum under the College Program. The curriculum includes a freshman/sophomore emphasis on strong preparation in mathematics, physics, chemistry, and biology. In the junior and senior years, students take a set of four core common courses and an additional set of advanced disciplinary or interdisciplinary courses that build on the basic sequences. The curriculum in Science of Earth Systems is outlined in more detail in the section, Interdisciplinary Centers, Programs, and Studies, in the front part of the catalog. Students interested in the new field should select ENGR 122 and ENGRD 201 and contact Profs. B. Isacks, W. Brutsaert, Y. Parlane, or M. Kelley.

**Bioengineering Option**

Students who elect this option will graduate with a B.S. degree in one of the traditional fields and with an administrative note on their transcript formally recognizing their efforts in bioengineering.

The requirements for completion of the option are as follows: 12 credit hours minimum and one credit hour of Bioengineering Seminar (ENGRG 501). These courses can simultaneously satisfy other degree requirements and are not necessarily four additional courses. These four courses must be selected from two categories: science-based courses and bioengineering courses. At least one course must be from the science-based course list and at least two from the bioengineering course list. Each student interested in the bioengineering option can request through the Engineering Advising office a bioengineering adviser who would assist the student in course selection for this option. The bioengineering adviser is in addition to the student's regular academic adviser.

A list of approved courses is available in the Engineering Advising office, 167 Olin Hall.

**International Programs**

An international perspective, sensitivity to other cultures, and the ability to read and speak a second language are increasingly important to engineers. In keeping with the university goals of internationalizing the curriculum, the College of Engineering encourages students to study or work abroad during their undergraduate years. The college sponsors a specially designed Semester in Europe program, supports students who wish to study abroad in regular exchange programs, and offers a special International Scholars College program for students to minor in international studies and study abroad during their junior year. For further information on these and other opportunities to add an international dimension to your undergraduate education, see Professor Richard Lance, 322 Thurston Hall; telephone: 255-5064; e-mail: rl18@cornell.edu. Information on co-op programs abroad is available from the Engineering Professional Programs office in 148 Olin Hall.

**Dual Degree Option**

A special academic option, intended for superior students, is the dual degree program, in which both a Bachelor of Science and a Bachelor of Arts degree can be earned in about five years. Students registered in the College of Engineering or the College of Arts and Sciences may apply and, after acceptance of their application, begin the dual program in their second or third year. Those interested should contact the coordinator of dual degree programs, 178 Carpenter Hall; or the associate dean for undergraduate programs in 221 Carpenter Hall; or an adviser in Engineering Advising, 167 Olin Hall.

**Double Major in Engineering**

The Double Major option, which makes it possible to develop expertise in two allied fields of engineering, generally requires at least one semester beyond the usual four years. Students affiliate with one field in the normal way and then petition to enter a second field before the end of their junior year. All the requirements of both fields must be satisfied. Further information is available from Engineering Advising, 167 Olin Hall, and the individual field contract offices.

**Engineering Communications Program**

The ability to communicate effectively is an essential aspect of successful professional practice. The Engineering Communications Program offers instruction in written, oral, and visual presentation. Engineering Communications (ENGRD 434) and Communications for Engineering Managers (ENGRG 435) are three-credit seminar courses designed for students who desire intensive work in these areas. Examples from real-life engineering contexts are analyzed, and many specific assignments are presented as professional case studies. Students learn to address audiences having different levels of technical expertise and to investigate the social and ethical implications of written and oral presentation. The courses fulfill the college's technical writing requirement (see Requirements for Graduation). The program also offers courses on topics of special interest and independent studies or projects in technical/professional communications. In addition to offering free-standing communications courses, the program works with engineering fields to integrate communications into technical courses. The program's faculty also advises student publications, facilitates writing and oral presentation competitions, and arranges discussions of professional communications with students and alumni. For further information, contact the director, 205 Carpenter Hall.

**Engineering Cooperative Program**

A special program for undergraduates in most fields of engineering is the Engineering Cooperative Program, which provides an opportunity for students to gain practical experience in industry and other engineering-related enterprises before they graduate. By supplementing course work with carefully monitored, paid jobs, co-op students are able to explore their own interests and acquire a better understanding of engineering as a profession.

Sophomores in the upper half of their class are eligible to apply for the co-op program. Students in computer science and agricultural and biological engineering are eligible, even though they may not be registered in the College of Engineering.) Applicants are interviewed by representatives of cooperating companies and select their work assignments from any offers they receive. Those students who are offered assignments and elect to join the program usually take their fifth-term courses at Cornell during the summer following their sophomore year and begin their first co-op work assignment that fall. They return to Cornell to complete term six with their classmates and then undertake a second work assignment with the same company the following summer. Co-op students return to campus for their senior year and graduate with their class.

Further information may be obtained from the Engineering Professional Programs office, 148 Olin Hall.

**MASTER OF ENGINEERING DEGREE PROGRAMS**

One-year Master of Engineering (M.Eng.) programs are offered in thirteen fields. These programs are discussed in this announcement in connection with the corresponding upperclass engineering field programs because the curricula are integrated. Cornell baccalaureate engineering graduates frequently continue their studies in the M.Eng. program, although the program is also open to qualified graduates of other schools. The M.Eng. degrees and the academic fields under which they are described are listed below.

- M.Eng. (Aerospace): Mechanical and aerospace engineering
- M.Eng. (Agricultural and Biological): Agricultural and biological engineering
- M.Eng. (Chemical): Chemical engineering
- M.Eng. (Civil & Environmental): Civil and environmental engineering
- M.Eng. (Computer Science): Computer science
- M.Eng. (Electrical): Electrical engineering
- M.Eng. (Engineering Physics): Applied and engineering physics
- M.Eng. (Geology): Geological sciences
- M.Eng. (Materials): Materials science and engineering
- M.Eng. (Mechanical): Mechanical and aerospace engineering
- M.Eng. (Nuclear): Nuclear science and engineering
M.Eng. (OR&IE): Operations research and industrial engineering

Candidates for a professional master's degree who wish to specialize in areas related to manufacturing may avail themselves of two special programs. The manufacturing systems engineering option may be centered in any one of the fields listed above. This option is described in the section related to the M.Eng. (Civil & Environmental) degree. A new management option in the M.Eng. (Chemical) degree program is also available.

Cornell engineering graduates in the upper half of their class will generally be admitted to M.Eng. programs; however, requirements for admission vary by field. Superior Cornell applicants who will be, at the time of matriculation, eight or fewer credits short of a baccalaureate degree may petition for early admission. Other applicants must have a baccalaureate degree or its equivalent from a college or university of recognized standing, in an area of engineering or science that is judged adequate for the proposed field of study. They must also present evidence of undergraduate preparation equivalent to that provided by a Cornell undergraduate engineering education, a transcript, two letters of recommendation, and a statement of academic purpose. A candidate who is admitted with an undergraduate background that is judged inadequate must make up any deficiencies in addition to fulfilling the regular course requirements for the degree. Applicants from foreign universities must submit the results of the Graduate Record Examination aptitude tests and must have an adequate command of the English language. Financial aid providing partial support is available for very highly qualified candidates, primarily those who are residents of the U.S. Industry-sponsored internships, which extend the program to two years, are also available to residents of the United States. Application form and further information are available from the graduate field offices.

Cooperative Programs with the Johnson Graduate School of Management

Two programs culminate in both Master of Engineering and Master of Business Administration degrees. One, which Cornell students enter during their undergraduate career, makes it possible to earn the B.S., M.Eng., and M.B.A. in six years—one year less than such a program would normally require. The second program, which is available to students who already hold baccalaureate degrees from Cornell or other institutions, requires five semesters and leads to both the M.Eng. and M.B.A.

Undergraduate students at Cornell interested in the cooperative program should seek advice and information from the department with whose field they intend to affiliate during their upperclass years. Information about admission to either program and about special scholarship aid may be obtained from the Engineering Professional Programs office, Olin Hall.

ACADEMIC PROCEDURES AND POLICIES

Advanced Placement Credit

The College of Engineering awards a significant amount of advanced placement (AP) credit to entering freshmen who demonstrate proficiency in the subject areas of introductory courses. Students may qualify for AP credit in one of two ways:

1) by receiving sufficiently high scores on advanced placement examinations given and scored by the College Entrance Examination Board (CEEB); or

2) by receiving sufficiently high scores on Cornell's departmental placement examinations, which are given during orientation week before fall-term classes begin. Advanced placement is granted only to first-year freshmen, and the placement examinations are scored before the students begin classes.

Advanced placement credit is intended to permit students to develop more challenging and stimulating programs of study. Students who receive AP credit for an introductory course may use it in three different ways:

1) They may enroll in a more advanced course in the same subject right away.

2) They may substitute an elective course from a different area.

3) They may enroll in fewer courses, using the AP credit to fulfill basic requirements.

Acceptable Subjects and Scores

The most common subjects for which AP credit is awarded in the College of Engineering, and the scores needed on qualifying tests, are listed below. In mathematics, physics, chemistry, and computer science, AP credit is awarded only for courses required in the engineering curriculum.

Mathematics: Math 191, 192, 293, and 294

First-year math (Math 191). AP credit may be earned by:

• a score of 3 or 4 on the CEEB BC exam, or

• a score of 4 or 5 on the CEEB AB exam, or

• a passing score on the Cornell departmental exam for first-year math.

First-year math (through Math 192). AP credit may be earned by:

• a score of 5 on the CEEB BC exam, or

• a passing score on the Cornell departmental exam for first-year math.

Physics: Physics 112 or 116 and 213 or 217 are required.

Physics 112. AP credit may be earned by:

• a score of 4 or 5 on the mechanics portion of the CEEB exam, or

• a score of 5 on the CEEB B exam only if the student has at least one semester of AP or transfer credit in first-term mathematics at the time of matriculation, or

• a passing score on the Cornell departmental exam for Physics 112.

Note: Students who have received credit for Physics 112 may not enroll in Physics 213 unless concurrently enrolled in Math 293.

Physics 213. Students, receiving a 5 on the Electricity and Magnetism portion of the C exam may choose to accept AP credit for Physics 213 or placement in Physics 217 with no AP credit for Physics 213. For advice or more information contact Professor Rich Galik, the departmental representative. His telephone number is 607/255-8533.

Chemistry: Chem 207 or Chem 211 is required.

Chem 207 or Chem 211. AP credit may be earned by:

• a score of 5 on the CEEB AP exam, or

• a passing score on the Cornell departmental exam for Chemistry.

Note: Students who are successful in obtaining AP credit for Chem 207 and who are considering majors in chemical engineering or materials science and engineering should consider enrolling in Chem 215. Those who are offered AP credit for Chem 207 and then elect to take Chem 215 will also receive academic credit for Chem 207. You may want to discuss this option with your faculty adviser.

Computing: Computer Science 100 is required. AP credit may be earned by:

• a score of 4 or 5 on the CEEB A or AB exam, or

• a passing score on the Cornell departmental exam for Computer Science 100.

Biology: Biology is not required of engineering students, although it is a popular option as an elective, especially for students who intend to pursue health-related careers. AP credit may be earned as follows:

• eight credits will be offered to students who receive a 5 on the CEEB AP exam;

• students receiving a 4 on the CEEB AP exam will be offered six credits.

Those who want to study more biology should contact the Office for Academic Affairs, Division of Biological Sciences, 200 Sinton Hall, to discuss proper placement.

Freshman Writing Seminar: Two Freshman Writing Seminars (for a total of six credits) are required.

AP credit for one Freshman Writing Seminar may be earned by a score of 5 on the CEEB AP English exam.

A score of 4 on the AP English exam will earn a student three credits in English. These three credits cannot be applied toward the Freshman Writing Seminar requirement, but can be applied toward the expressive arts category in the Liberal Studies Distribution
requirement. AP credit earned in the humanities and social sciences cannot be used to fulfill the “upper level” liberal studies requirement.

**Liberal Studies Distribution:** Six courses beyond two Freshman Writing Seminars are required. Students may earn AP credit toward the liberal studies requirement by taking the College Entrance Examination Board (CEEB) AP test or by taking the Cornell Advanced Standing Examination (CASE). Those who score 4 or 5 on the CEEB AP test are entitled to three credits. In order to qualify for the CASE exam, the student must score at least 560 on a College Placement Test (taken either in high school or at Cornell during Orientation Week). A score of 2 on the CASE entitles the student to two credits, and a score of 3 entitles the student to six credits. Modern language AP credits may be used to satisfy the foreign language category of the liberal studies distribution, or may meet an approved elective requirement, contingent on discussions with the faculty advisor.

**General Policies for AP Credit**

The general policies in the College of Engineering governing awards of AP credit are as follows:

1. AP credit will not be offered in any subject area without a documented examination (CEEB or departmental).
2. All AP examinations (both CEEB and departmental) are normally taken and scored before fall-term classes begin. Students who take CEEB AP tests in high school should have an official report of their scores sent directly to Cornell as soon as possible. Those who wish to take departmental examinations must do so during Orientation Week; permission to take these tests after the start of fall-term classes must be requested in a written petition to the College’s Committee on Academic Standards, Petitions, and Credit (ASPAC), and must be filed within the first three weeks of the fall semester.
3. Exemption from AP exams may be granted, students offered AP credit must accept or decline within the first three weeks of the fall term at Cornell in the Engineering Registrar’s office, 170 Olin Hall. Final AP awards are recorded on the last day of the third week.

A more detailed description of the college’s policies concerning advanced placement credit and its use in developing undergraduate programs may be found in the pamphlet *Advanced Placement and Transfer Credit for First-Year Engineering Students*, which may be obtained from Engineering Advising, 167 Olin Hall.

**Transfer Credit**

Entering freshmen and transfer students who have completed courses at recognized and accredited colleges may, under certain conditions, have credits for such courses transferred to Cornell. Such courses must represent academic work in excess of that required for the secondary school diploma. Courses deemed acceptable for transfer credit must be equivalent in scope and rigor to courses at Cornell. Transfer credit must be applied for by petition, and the application must be accompanied by a course description. Transfer Credit forms are available from the Engineering Advising office or Registrar. An official transcript (bearing the institutional seal and registrar’s signature) must be sent to the Engineering Registrar’s office before official transfer credit will be awarded.

To apply for transfer credit to satisfy requirements in mathematics, science, and engineering courses, and the Freshman Writing Seminar, a student must receive approval from the department offering an equivalent course at Cornell. The department certifying the course may require course materials, textbooks used, etc., in addition to the course description before approving the course.

To apply for transfer credit to satisfy liberal studies distribution or elective requirements, departmental approval is not required. The course will be reviewed for approval by a representative of the Committee on Academic Standards, Petitions, and Credit (ASPAC) in the Engineering Advising office.

Cornell does not award credit for courses in which a student earned a grade less than C; schools and departments may stipulate a higher minimum grade.

College courses completed under the auspices of cooperative college and high school programs will be considered for advanced placement credit only if students demonstrate academic proficiency by taking the appropriate CEEB or Cornell departmental placement examination, as described in the Advanced Credit section.

After matriculation no more than 18 credits of transfer or Cornell extramural credit may be used to satisfy bachelor’s degree requirements. Summer session courses taken at Cornell are not considered transfer credits.

Transfer students may transfer up to 36 credits for each year spent in full-time study at Cornell. The department certifying the course must be equivalent in scope and rigor to courses at Cornell.

**Academic Standing**

Full-time students are expected to remain in good academic standing. The criteria for good standing vary somewhat as a student progresses through the four years of the engineering curriculum. At all times, the student must be making adequate progress toward a degree, but what this actually means varies from field to field.

Requirements for freshman engineering students to be in good standing at the end of the first semester are as follows. Failure to meet these standards will result in a review by the Committee on Academic Standards, Petitions, and Credit (ASPAC), and the actions of warning, stem warning, required leave of absence, or withdrawal from the College of Engineering may be taken.

1. at least 12 credits passed, including at least two courses from mathematics, science, and/or engineering;
2. a C- or better in the mathematics course;
3. a semester average of 2.0 or higher.

Requirements for second semester freshman and first semester sophomores to be in good standing are as follows. Failure to meet these standards will result in a review by the Committee on Academic Standards, Petitions, and Credit (ASPAC), and the actions of warning, stem warning, required leave of absence, or withdrawal from the College of Engineering may be taken.

1. at least 14 credits passed in courses that meet engineering degree requirements;
2. a C- or better in the mathematics course, if one was taken;
3. a semester average of 2.0 or higher.

**Academic Progress**

The total number of credits required for graduation ranges from 123 to 129, depending upon the field program. Therefore, an average semester credit load ranges from approximately 15 to 16 credits.

Because mathematics is pivotal to the study and practice of engineering, students must earn a grade of C- or better in Math 191, 192, 293, and 294. Those who fail to meet this standard are allowed to repeat a course once, in the following semester. Failure to achieve at least a C- the second time will generally result in dismissal from the engineering program. Physics and advanced mathematics courses often have mathematics prerequisites, and having to repeat the prerequisite course may delay your progress in the physics and mathematics curricula.

**Dean's List**

Dean’s List citations are presented each semester to engineering students with exemplary academic records. The criteria for this honor, which are determined by the dean of the college, are a term average of 3.25 or higher with no failing, unsatisfactory, or incomplete grades (even in physical education) and 12 credits or more of letter grades. Students may earn Dean’s List status retroactively if they meet these criteria after making up incompletes according to college rules.

**S-U Grades**

The option of receiving a grade of “satisfactory” or “unsatisfactory” (S-U) in a particular course, rather than a grade on a graduated scale, may be selected only in the following circumstances: Students who want to take a course on an S-U basis must have completed at least one full semester of study at Cornell, and they may take only one course per semester or on an S-U basis. Only courses in the liberal studies and approved electives categories may be taken as S-U courses. Students may preregister for the S-U option. To change a grading option, a properly completed and approved add/drop form must be filed with the registrar of the College of Engineering by the end of the first three weeks of the semester. After this deadline, the grading option may not be changed under any circumstances, even by petition, and no
courses may be added with the S-U option selected.

The S-U policy does not apply to courses in physical education and other courses that are not taken to fulfill degree requirements. When a particular course is offered only on an S-U basis, a student may petition to take a second S-U course in the same term.

**Residence Requirements**

Candidates for an undergraduate degree in engineering must spend at least four semesters or an equivalent period of instruction as full-time students at Cornell. They must also spend at least three semesters of this time affiliated with an engineering field program or with the College Program.

Students who are voluntarily not enrolled at Cornell as full-time students may take individual courses extramurally through the School of Continuing Education and Summer Sessions. Students who have been required to take time off are permitted to register for courses extramurally only with the approval of their field (or the college, for unaffiliated students). No more than 18 credits earned through extramural study or acquired as transfer credit (or a combination thereof) may be used to satisfy the requirements for the bachelor’s degree in engineering.

Degree candidates may spend periods of time studying away from the Cornell campus with appropriate authorization. Information on programs sponsored by other universities and on procedures for direct enrollment in foreign universities is available at the Cornell Abroad office, 474 Uris Hall. Programs should be planned in consultation with Professor Richard Lance, 322 Thurston Hall, or with the staff of Engineering Advising, who can provide information on credit-evaluation policies and assist in the petitioning process.

**Transferring within Cornell**

It is not uncommon for students to change their academic or career goals after matriculation in one college and decide that their needs would be better met in another college at Cornell. While transfer between colleges is not guaranteed, efforts are made to assist students in this situation.

The office responsible for assisting students with the transfer process is the Internal Transfer Division office. Students who wish to transfer out of the College of Engineering to another college at Cornell should consult initially with the Engineering Advising office.

Students who wish to transfer into the College of Engineering can make application to the Office of Engineering Admissions—application forms are available in the Carpenter Hall Annex. Students who would enter the college as second-semester sophomores or upperclassmen must be accepted by a field program as part of the admission process. Others may be accepted into the college without the requirement of field affiliation.

Students who hope to transfer into engineering should take courses in mathematics, chemistry, computer science, and physics that conform to the requirements of the Common Curriculum. Advised students should discuss their eligibility with an adviser in Engineering Advising, 167 Olin Hall.

**Leave of Absence**

A leave of absence may be voluntary, medical, or required. Following is a description of each:

- **Voluntary Leave:** Students sometimes find it necessary to suspend their studies. To do this, students must petition for a leave of absence for a specified period of time and receive written approval.

  Affiliated students request leave through their fields. Unaffiliated students request leave through Engineering Advising; the first step is an interview to establish conditions for the leave and subsequent return. Those who take a leave before affiliating with a field and while not in good standing may be given a “conditional leave.” This requires them to meet specific conditions, established at the time the leave is granted, before they will be reinstated.

  Leaves of absence are not generally granted for more than two years. A leave of absence or withdrawal during a semester goes into effect on the day it is requested and lasts for a **minimum of six months**. Leaves requested after the twelfth week of a semester generally take effect at the end of the semester, and conditions in which the student was registered at the time of the request are treated as having been dropped. Students who owe money to the university are ineligible for leaves of absence. If courses taken during a leave are to satisfy Cornell degree requirements, they must be approved *in advance* through a formal transfer petition. No more than 18 credits earned while on leave can be used to meet degree requirements.

  Students who intend to take a leave of absence should check with the Office of Financial Aid and Student Employment to find out about financial implications; this is especially true for those who have taken out educational loans. Medical insurance eligibility may also be affected.

  To return after a leave of absence, the conditions established when the leave was granted must be satisfied, and the college must be notified.

  Students wishing to rejoin the college who have not yet affiliated with a field should request permission to rejoin in a letter to Engineering Advising; affiliated students should contact their field office. This must be done at least six weeks before the beginning of the semester in which the student wishes to return. The letter should describe the student’s activities while away from Cornell, and any academic work completed during this time, and specify the courses the student intends to take upon return.

- **Medical Leave:** Medical leaves are granted by the college only upon recommendation by a physician from Gannett Health Center. Such leaves are granted for at least six months and up to five years with the understanding that the student may return at the beginning of any term after the medical condition in question has been corrected. In some cases students must satisfy the Gannett Health Center that the condition has not improved before they may return.

  The student’s academic standing will also be subject to review at the time of the leave and on return.

- **Required Leave:** A required leave of absence is imposed in cases where the academic progress of a student is so poor that simply continuing into the next semester does not appear prudent. An example where a leave of absence would be required might be failure in several courses in a semester. Unless the student is ahead in the curriculum, returning later to repeat the semester makes better academic sense than continuing without the necessary background. In many cases, the leave is dictated by courses that are only offered in the fall or the spring semester. Leaves are given when the probability of success is increased substantially by deferring the student’s return by one semester (or, in unusual circumstances, one year).

**Withdrawal from the College**

A withdrawal from the College of Engineering may be voluntary or required. Following is a description of each:

- **Voluntary Withdrawal:** Students who voluntarily withdraw from the engineering degree program sever all connection with the college. Unaffiliated students who wish to withdraw should do so through Engineering Advising. Affiliated students should contact their field office. If a withdrawal is requested during the semester, courses in which the student is enrolled must be dropped in accordance with applicable regulations.

  Any student who fails to register in the first three weeks of the semester, without benefit of a leave of absence or permission for study in absence, will be deemed to have withdrawn.

  Students who withdraw from the College of Engineering are eligible for application to admission to one of the other six colleges at Cornell. The intra-university transfer process should be followed.

  If students who have withdrawn subsequently wish to return, they must make a formal application for readmission. This is rarely granted. It is subject to a review of the student’s academic background and depends on available space in the college and in the student’s major field.

- **Required Withdrawal:** Students are withdrawn from the college only when their overall record indicates that they are either incapable of completing the program or not sufficiently motivated to do so. This action only withdraws them from the College of Engineering and does not, in and of itself, adversely affect their ability to transfer and complete a degree in one of the other colleges in the university.

**ENGINEERING CAREER SERVICES**

Individual advising and group seminars are available for students who desire assistance in career and job-search matters. Interviews are arranged between students and more than 250 national companies that visit the campus to recruit technical graduates. A state-of-the-art résumé referral service is offered for a small fee. Both undergraduate and graduate students can use these services to pursue permanent or summer employment opportunities. Further information on all services is available from the Engineering Career Services office, 201 Carpenter Hall (255-5103).
**AGRICULTURAL AND BIOLOGICAL ENGINEERING**


**Bachelor of Science Curriculum**

The Field Program in Agricultural and Biological Engineering prepares students for engineering practice in biological and physical systems represented in agriculture and its supporting industries and agencies, environmental or resource protection agencies, the biotechnological industries, the health industries, international engineering, and the food industries. Engineering is applied to production, handling, storage, processing, distribution, and use of plant and animal products and biomass. Issues of environmental quality and safety and separation of soil, water, and energy resources are important. Emerging areas of study include engineering aspects of biotechnology and animal and human health. Biological sciences are integrated into the field program along with engineering design and studies in the physical sciences. Areas of concentration include agricultural engineering, biological engineering, and environmental systems engineering.

The program is jointly administered by the College of Engineering and the College of Agriculture and Life Sciences. Students are enrolled only in the College of Agriculture and Life Sciences during their first four semesters and jointly in the College of Engineering in the remaining semesters. Engineering college tuition is required for one year and is typically paid during the fifth and sixth semesters of study. Additional information about the program may be found in the section on the College of Agriculture and Life Sciences in this publication.

Graduates find employment in agricultural and food processing industries, environmentally related firms and government agencies, and the biotechnology and health industries. Many graduates pursue a professional (Master of Engineering) or research (Master of Science or doctoral) degree. Agricultural and biological engineers are employed in private industry, consulting firms, government agencies, utility companies, and educational institutions. The unique blend of engineering and the biological sciences and the breadth of educational programs in agriculture and biological engineering has been attractive to employers.

For further details see the department's undergraduate programs publication, available at 207 Riley-Robb Hall, or contact the field's coordinator of instruction Professor Kifle Gebremedhin at 255-2499.

The field program requirements are outlined below.

**Basic Subjects**

**Credits**

- Math 191, 192, 293, 294, Calculus 16
- Courses for Engineers and Engineering Mathematics 16
- Chemistry 211, General Chemistry, or equivalent 4
- Physics 112, 213, 214, Physics I, II, and III (organic chemistry or biochemistry may be substituted for Physics 214) 12
- Introductory biological sciences 6 or 8
- ABEN 151, Introduction to Computer Programming 4
- ABEN 200, Undergraduate Seminar 1
- Engineering distribution (two courses, including Mechanics of Solids) 6
- Liberal studies (two freshman seminars and at least two courses in humanities or history) 24

**Advanced and Applied Subjects**

Engineering sciences in any field (must include fluid mechanics and thermodynamics), plus ABEN 250, 350, 396 and 496 (Engineering Applications in Biological Systems, Transport Principles, Fundamental of Design, and Computer Aided Design Project, respectively) and a minimum of three agricultural and biological engineering courses (at least 9 credits) chosen from courses numbered 450 to 495 35

Biological or agricultural sciences (at least 3 credits of biological sciences beyond the introductory level) 9

Approved electives (at least 3 credits in the College of Agriculture and Life Sciences) 6

Total (minimum) 123

**Master of Engineering (Agricultural and Biological) Degree Program**

The program for the M.Eng. (Agricultural and Biological) degree is intended primarily for those students who plan to enter engineering practice. The curriculum is planned as an extension of an undergraduate program in agricultural and biological engineering but can accommodate graduates of other engineering disciplines. The curriculum consists of 30 credits of courses intended to strengthen the student's fundamental knowledge of engineering and develop their design skills. At least three of the required 30 credits are earned for an engineering design project that culminates in a written and oral report.

A candidate for the M.Eng. (Agricultural and Biological) degree may choose to concentrate in one of the subareas of agricultural and biological engineering or take a broad program without specialization. The subareas include aquaculture, agricultural engineering, biological engineering, energy, environmental engineering, food engineering, structures and their environments, waste management, and highway engineering. Elective courses are chosen from among engineering subject areas relevant to the student's interest and design project. Courses in technical communication, mathematics, biology, and the physical sciences may also be taken as part of a coherent program. Master of Engineering students in applied and biological engineering can qualify for the Dean's Certificate in energy, manufacturing, or bioengineering by choosing their design project and some electives from the designated topic area.

**APPLIED AND ENGINEERING PHYSICS**


**Bachelor of Science Curriculum**

The undergraduate engineering physics curriculum is designed for students who want to pursue careers of research or development in applied science or advanced technology. Its distinguishing feature is a focus on the physics and mathematics fundamentals, both experimental and theoretical, that are at the base of modern engineering and research and have a broad applicability in these areas. By choosing areas of concentration, the students may combine this physics base with a good background in a conventional area of engineering or applied science.

The industrial demand for graduates with baccalaureates is high, and many students go directly to industrial positions where they work in a variety of areas that either combine, or are in the realm of, various more conventional areas of engineering. Recent examples include bioengineering, computer technology, electronic-circuit and instrumentation design, energy conversion, environmental engineering, geological analysis, laser and optical technology, microwave technology, nuclear technology, software engineering, solid-state device development, technical management, and financial consulting. A number of our graduates go on for advanced study in all areas of basic and applied physics, as well as in a diverse range of areas in advanced science and engineering. Examples include applied physics, astrophysics, atmospheric sciences, biophysics, cell biology, computer science and engineering, electrical engineering, environmental science, fluid mechanics, geotechnology, laser optics, materials science and engineering, mechanical engineering, medical physics, mathematics, medicine, nuclear engineering, oceanography, and physics. The undergraduate program can also serve as an excellent preparation for medical school, business school, or specialization in patent law.

The engineering physics program fosters this breadth of opportunity because it both stresses the fundamentals of science and engineering and gives the student direct exposure to the application of these fundamentals. Laboratory experimentation is emphasized, and ample opportunity for innovative design is provided. Examples are A&EP 110, The Laser, and Applications in Science, Technology, and Medicine (a freshman Introduction to Engineering course); A&EP 264, Computer- Instrumentation Design (a recommended sophomore engineering distribution course); A&EP 330, Modern Experimental Optics (a junior/senior
Some courses (though the list is not all-inclusive) that will satisfy this requirement are Physics 444, Nuclear and High-Energy Particle Physics; Physics 454, Introductory Solid-State Physics; A&EP 363, Electronic Circuits (a sophomore/junior course); Physics 410, Advanced Experimental Physics; and A&EP 438, Computational Engineering Physics (a senior computer laboratory).

Undergraduates who plan to enter the Field Program in Engineering Physics are advised to arrange their Common Curriculum with their developing career goals in mind. Students are also encouraged to take Physics 112 or 116 during their first semester (if their advanced placement credits permit) and are recommended to satisfy the computing applications or technical writing requirement with the engineering distribution course A&EP 264. Engineering physics students need to take only two engineering distribution courses, since A&EP 333, which they take in their junior year, counts as a third member of this category. Engineering Physics students are advised to take A&EP 363 in the spring semester of the sophomore year. Students with a year of advanced placement in math may wish to enroll in A&EP 321 and 322 in their sophomore year.

In addition to the requirements of the Engineering Common Curriculum,* the upperclass course requirements of the field program are as follows:

**Course**  
**Credits**

- A&EP 333, Mechanics of Particles and Solid Bodies 4
- A&EP 355, Intermediate Electromagnetism 4
- A&EP 356, Intermediate Electrodynamics 4
- A&EP 361, Introductory Quantum Mechanics 4
- A&EP 363, Electronic Circuits 4
- A&EP 423, Statistical Thermodynamics 4
- A&EP 434, Continuum Physics 4
- Physics 410, Advanced Experimental Physics 4
- A&EP 321, Mathematical Physics I; Mathematics 421; or T&AM 610 (applied mathematics) 4
- A&EP 322, Mathematical Physics II; Mathematics 422; or T&AM 611 (applied mathematics) 4
- Applications of quantum mechanics 3 or 4
- Four technical electives 12–16
- A third approved elective (in addition to the two required by the Common Curriculum) 3

Total field credits=58 credit hours minimum.

*The Engineering Common Curriculum allows students to take only 4 courses each semester of their freshman year if they so desire. This course load is fully consistent with the requirements of the EP major, but entering students with strong preparation are encouraged to consider taking an additional course during one or both semesters of the freshman year so that they may have additional flexibility and the opportunity to develop and individualized educational program in their later years, and for best maintaining such options as a semester or year abroad, or early graduation.

†Some courses (though the list is not all-inclusive) that will satisfy this requirement are Physics 444, Nuclear and High-Energy Particle Physics; Physics 454, Introductory Solid-State Physics; A&EP 438, Computational Engineering Physics; A&EP 440, Quantum and Nonlinear Optics; A&EP 609, Low-Energy Nuclear Physics; and A&EP 438, Computational Engineering Physics (a senior computer laboratory).

A scientific computing course was not selected as an engineering distribution course, one of these technical electives may be needed to satisfy the computing applications requirement. For students going on to graduate school a third course in mathematics is recommended.

**Areas of concentration.** A distinctive aspect of the Engineering Physics curriculum is the strong opportunity it provides students to develop individualized programs of study to meet their particular educational and career goals. These can include the pursuit of dual majors or the development of a broad expertise in one or more of a number of advanced technical and scientific areas. With at least seven technical and approved electives in the sophomore, junior, and senior years, Engineering Physics majors are encouraged to work closely with their advisor to develop a coherent academic program that is in accordance with their interests. Students who look toward an industrial position after graduation, these electives should be chosen to widen their background in a specific area of practical engineering. A different set of electives can be selected as preparation for medical, law, or business school. For students who plan on graduate studies, the electives provide an excellent opportunity to explore upper-level and graduate courses, and to prepare themselves particularly well for graduate study in any one of a number of fields. Various programs are described in a special brochure available from the School of Applied and Engineering Physics, Clark Hall. Students interested in these options are advised to consult with their EP adviser, a professor active in their area of specialization.

Electives need not be all formal course work: Qualified students are encouraged to undertake informal study under the direction of a member of the faculty (A&EP 490). This may include research or design projects in areas in which faculty members are active.

The variety of course offerings and many electives provide a sizable flexibility in scheduling. If scheduling conflicts arise, the school may allow substitution of courses nearly equivalent to the listed required courses.

The Engineering Physics program requires that a minimum GPA of 2.7 (B-) be attained in all physics and mathematics courses taken by a student before entering the Engineering Physics field unless approval is obtained from the A&EP associate director. To remain in good standing in the field, the engineering physics student is expected to pass every course for which he or she is registered, to earn a grade of C- or better in specifically required courses, and to attain each semester a grade point for that semester of at least 2.3. In addition, students with a cumulative GPA of 3.5 or greater who elect to do an independent study project (A&EP 490) are eligible for a degree with honors.

**Master of Engineering (Engineering Physics) Degree Program**

The M.Eng. (Engineering Physics) degree may lead directly to employment in engineering design and development or may be basis for further graduate work. Students have the opportunity to broaden and deepen their preparation in the general field of applied physics, or they may choose the more specific option of preparing for professional engineering work in a particular area such as laser and optical technology, microstructure science and technology, device physics, materials characterization, or software engineering. A wide latitude is allowed in the choice of the required design project.

One example of a specific area of study is solid-state physics and chemistry as applied to microstructure science and technology. Core courses in this specialty include the micro- characterization of materials (A&EP 661) and the microprocessing and microfabrication of materials (A&EP 662). The design project may focus on such areas as semiconductor materials, device physics, microstructure technology, or optoelectronics. Another area of study may be controlled-nanomaterials. Core courses can be chosen from applied physics, electrical engineering, and physics.

Each individual program is planned by the student in consultation with the program chair. The objective is to provide a combination of a good general background in physics and introductory study in a specific field of applied physics. Candidates may enter with an undergraduate preparation in physics, engineering physics, or engineering. Those who have majored in physics usually seek advanced work with an emphasis on engineering, those who have majored in an engineering discipline generally seek to strengthen their physics base. Candidates coming from industry usually want instruction in both areas. All students granted the degree will have demonstrated competence in an appropriate core of basic physics; if this has not been accomplished at the undergraduate level, subjects such as electricity and magnetism, or classical, quantum, and statistical mechanics should be included in the program.

The general requirement for the degree is a total of 30 credits for graduate-level courses or their equivalent, earned with a grade of C or better and distributed as follows:

1) a design project in applied science or engineering (not less than 6 nor more than 12 credits)
2) an integrated program of graduate-level courses, as discussed below (14 to 20 credits)
3) a required special-topics seminar course (4 credits)

The design project, which is proposed by the student and approved by the program chair, is carried out on an individual basis under the guidance of a member of the university faculty. It may be experimental or theoretical in nature; it is not experimental, a laboratory physics course is required.

The individual program of study consists of a compatible sequence of courses focused on a specific area of applied physics or engineering. It is planned to provide an appropriate combination of physics and physics-related courses (applied mathematics, statistical
mechanics, applied quantum mechanics) and engineering electives (such as courses in biophysics, chemical engineering, electrical engineering, materials science, computer science, mechanical engineering, or nuclear engineering). Additional science and engineering electives may be included. Some courses at the senior level are acceptable for credit toward the degree; other undergraduate courses may be required as prerequisites but are not credited toward the degree.

Students interested in the M.Eng.(Engineering Physics) degree program should contact Professor R. V. E. Lovelace.

APPLIED MATHEMATICS

The Center for Applied Mathematics administers a broadly based interdepartmental graduate program that provides opportunities for study and research in a wide range of the mathematical sciences. For detailed information on opportunities for graduate study in applied mathematics, contact the director of the Center for Applied Mathematics, 657 Engineering and Theory Center Building.

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

A list of selected graduate courses in applied mathematics may be found in the description of the Center for Applied Mathematics, in the section “Interdisciplinary Centers and Programs.”

CHEMICAL ENGINEERING


Bachelor of Science Curriculum

The undergraduate Field Program in Chemical Engineering comprises a coordinated sequence of courses beginning in the sophomore year and extending through the fourth year. Special programs in biochemical engineering and polymeric materials are available. Students who plan to enter the field program take Chemistry 208 as an approved elective during the freshman year. The program for the last three years, for students who have taken two engineering distribution courses during the first year and entered Cornell before Fall 1994 is as follows:

Term 4

<table>
<thead>
<tr>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 294, Engineering Mathematics</td>
</tr>
<tr>
<td>Phys 214, Optics, Waves, and Particles</td>
</tr>
<tr>
<td>Chem 290–390, Physical Chemistry</td>
</tr>
<tr>
<td>Engineering distribution course</td>
</tr>
<tr>
<td>Humanities or social sciences course</td>
</tr>
</tbody>
</table>

Term 5

<table>
<thead>
<tr>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 253, Organic Chemistry**</td>
</tr>
<tr>
<td>Chem 251, Organic Chemistry Laboratory</td>
</tr>
<tr>
<td>CHEM 313, Chemical Engineering Thermodynamics</td>
</tr>
<tr>
<td>CHEM 323, Fluid Mechanics</td>
</tr>
<tr>
<td>Humanities or social sciences course</td>
</tr>
</tbody>
</table>

Term 6

<table>
<thead>
<tr>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Science elective†</td>
</tr>
<tr>
<td>CHEM 101, Nonresident Lectures</td>
</tr>
<tr>
<td>CHEM 324, Heat and Mass Transfer</td>
</tr>
<tr>
<td>CHEM 332, Analysis of Separation Processes</td>
</tr>
<tr>
<td>CHEM 390, Reaction Kinetics and Reactor Design</td>
</tr>
<tr>
<td>Humanities or social sciences course</td>
</tr>
</tbody>
</table>

Term 7

<table>
<thead>
<tr>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 432, Chemical Engineering Laboratory</td>
</tr>
<tr>
<td>CHEM 472, Process Control</td>
</tr>
<tr>
<td>Electives*</td>
</tr>
</tbody>
</table>

Term 8

<table>
<thead>
<tr>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 462, Chemical Process Design</td>
</tr>
<tr>
<td>Humanities or social sciences course</td>
</tr>
<tr>
<td>Electives*</td>
</tr>
<tr>
<td>Humanities or social sciences course</td>
</tr>
</tbody>
</table>

**Chemistry 357 may be substituted for CHEM 253. The applied science elective must then be CHEM 358.

†Applied science electives include Biological Sciences 290, General Microbiology Lectures; Biological Sciences 330 and 331, Principles of Biochemistry; CEE 654, Aquatic Chemistry; CHEM 640, Polymeric Materials; CHEM 673, Adsorption and Reactions on Chemically Reactive Solids; Food Science 409, Food Chemistry, MS&E 531, Structure of Materials; MS&E 532, Electrical and Magnetic Properties of Materials; MS&E 441, Microprocessing of Materials; MS&E 449, Introduction to Ceramics; MS&E 452, Properties of Solid Polymers; any A&EP course numbered 333 or above; any Chemistry course numbered 301 or above; any Physics course numbered 300 or above.

Bachelor of Science Curriculum

The School of Civil and Environmental Engineering offers an accredited undergraduate program in civil engineering and permits students to pursue one of two options leading to the B.S. degree: civil engineering or environmental engineering. Within civil engineering, students may emphasize structural engineering, geotechnical engineering, hydraulics and hydrology, or transportation. The environmental engineering curriculum emphasizes study of environmental engineering, environmental and water resource systems, and hydraulics and hydrology. Sample curricula are available in the school office, 220 Hollister Hall.

Requirements for Admission to the Field:

Students planning to enter the Field Program in Civil and Environmental Engineering are required to complete ENGRD 202, Mechanics of Solids, either before or during the sophomore year with a grade of C- or better. Additional requirements for affiliation in the field are grade-point averages of at least 2.0: (1) in all engineering and science courses; (2) in the term immediately prior to affiliation; and (3) cumulatively for all courses.

Master of Engineering (Chemical) Degree Program

The professional master's degree, M.Eng.(Chemical), is awarded at the end of one year of graduate study with successful completion of 30 credits of required and elective courses in technical fields including engineering, mathematics, chemistry, physics, and business administration. Courses emphasize design and optimization based on the economic factors that affect design alternatives for processes, equipment, and plants. General admission and degree requirements are described in the college's introductory section.

Specific requirements include:

1) two courses in advanced chemical engineering fundamentals chosen from CHEM 711, 713, 731, and 751

2) two courses in applied chemical engineering science chosen from CHEM 564, 565, 640, 641, and 661

3) a minimum of 3 credits of a design project, CHEM 565

Dean's certificate programs in Bioengineering, Engineering Management, Energy Engineering, and Manufacturing are available. A program offered jointly with the Food Science Department is also available, leading to both the Master of Engineering and the Master of Professional Studies degrees.

CIVIL AND ENVIRONMENTAL ENGINEERING

Required Engineering Distribution Courses:
The recommended engineering distribution course for students planning to enter the environmental engineering option is ENGRD 219. Students entering the environmental option who have not taken ENGRD 219 will be required to do so as part of the Field Program.

Recommended engineering distribution courses for students planning to enter the civil engineering option are:

ENGRD 261, Introduction to Mechanical
Properties of Materials, for students interested in structural engineering or civil engineering materials;
ENGRD 201, Introduction to the Physics and Chemistry of the Earth, for students interested in geotechnical engineering;
ENGRD 221, Thermodynamics, for students interested in fluid mechanics and hydraulics/hydrology;
ENGRD 211, Computers and Programming, for students interested in transportation.

Field Program:
These field program requirements will apply to all students in the Class of 1998, and students in the Class of 1997 are strongly encouraged to follow these new curriculum options as well.

Environmental Engineering
For the Field Program in Environmental Engineering, students must take CHEM 208 in place of PHYS 214. The following nine courses are required in addition to those required for the Common Curriculum:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGRD 241, Engineering Computation*</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 253, Elementary Organic Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>BIOM 290, General Microbiology, Lectures</td>
<td>3</td>
</tr>
<tr>
<td>CEE 304, Uncertainty Analysis in Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CEE 323, Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>CEE 331, Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>CEE 341, Introduction to Geotechnical Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CEE 351, Environmental Quality Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ABEN 475, Environmental System Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

Additional requirements include a set of two field-approved electives (one from outside the field) and three design electives from an approved list of courses which is available in the school office. In addition, students must complete one technical communications course from among the courses designated ENGRD 270 or approved Communications courses. If the technical course is taken as an expressive art, then students must take an additional approved elective from a department or school other than Civil and Environmental Engineering.

*ENGRD 241 can be used to satisfy both the computer application requirement and a field program requirement.
†ENGRD 270 may be accepted (on petition) as a substitute for CEE 304 in the field program, but only if ENGRD 270 is taken before entry into the field, or in some special cases where co-op or study abroad programs necessitate such a substitution.

Master of Engineering (Civil) Degree Program
The M.Eng. (Civil) degree program is a 30-credit (usually ten-course) curriculum designed to prepare students for professional practice. There are two options in this program: one in civil and environmental engineering design and one in engineering management. Both options require a broad-based background in an engineering field. Applicants holding an ABET-accredited (or equivalent) undergraduate degree in engineering automatically satisfy this requirement. Those without such preparation will require course work beyond the graduate program's 30-credit minimum to fulfill the engineering preparation requirement. Both options also require one course in professional practice and a two-course project sequence. The project entails synthesis, analysis, decision making, and application of engineering judgment. Normally it is undertaken in cooperation with an outside practitioner, and it includes an intensive, full-time, three-week session between semesters. The general degree requirements and admissions information are described above in the section entitled "Master of Engineering Degree Programs." Each student's program of study is designed individually in consultation with an academic adviser and then submitted to the school's Professional Degree Committee for approval.

For the M.Eng. (Civil) program in civil and environmental engineering design options, the requirements are:

1) Three courses, one in professional engineering practice (CEE 503) and a two-course design project (CEE 501 and 502)
2) Specialization in a major—three to five courses in either environmental engineering, environmental and public systems engineering, geotechnical engineering, hydraulic engineering, remote sensing, structural engineering, or transportation engineering
3) Two courses in a single related or minor area
4) Technical electives (up to two courses)
5) Courses in the minor and electives may consist of graduate or advanced courses in fields related to the major, either inside or outside of the school.

For the M.Eng. (Civil) program in the engineering management option, the requirements are:

1) Five courses: Management Practice (CEE 500), Engineering Management Methods (CEE 593 and 594), and the Management Project (CEE 591 and 592).
2) One course in finance, accounting, or engineering economics, as appropriate given a student's background.
3) One course in individual and/or organizational behavior from a recommended list.
4) Three courses from a disciplinary or functional specialization, subject to adviser's approval.

Applications for the six-year B.S./M.Eng./M.B.A. program must be submitted at the beginning of the sixth term of study.

COMPUTER SCIENCE

Bachelor of Science Curriculum
The Field Program in Computer Science is intended for students who are interested in the computing process and in the fundamental structure of algorithms, data, and languages that underlie that process.

A student entering the Field Program in Computer Science must take COM S 211 or 212 and COM S 280 before beginning the upperclass sequence. Students who do not earn a grade of B- or better in both COM S 211 or 212 and COM S 280 are strongly advised against attempting the computer science field program. Students who have not maintained an average of at least 3.0 in the mathematics courses required by the Common Curriculum are also discouraged
from entering the program. Apart from these requisites and those of the college, the courses required for the Field Program in Computer Science are:

**Course Work**

<table>
<thead>
<tr>
<th>Systems sequence</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM S 314, Systems and Organization</td>
<td>11</td>
</tr>
<tr>
<td>COM S 410, Data Structures</td>
<td></td>
</tr>
<tr>
<td>COM S 414, Systems Programming and Operating Systems</td>
<td></td>
</tr>
<tr>
<td>Theory sequence</td>
<td>8</td>
</tr>
<tr>
<td>COM S 381 or 481, Theory of Computing</td>
<td></td>
</tr>
<tr>
<td>COM S 482, Analysis of Algorithms</td>
<td></td>
</tr>
<tr>
<td>Numerical Analysis</td>
<td>3–4</td>
</tr>
<tr>
<td>COM S 222, Scientific Computation, or COM S 421, Numerical Solutions of Algebraic Equations</td>
<td></td>
</tr>
<tr>
<td>Computer science electives</td>
<td>8–9</td>
</tr>
<tr>
<td>Two nonrequired computer science courses numbered 400 or above,* plus a laboratory project course (for example, COM S 415, 418, 453, 465, or 473).</td>
<td></td>
</tr>
<tr>
<td>Related electives</td>
<td>14–16</td>
</tr>
<tr>
<td>One mathematically oriented course plus three courses forming an upper-level concentration in mathematics, operations research, electrical engineering, or another technical area.</td>
<td></td>
</tr>
<tr>
<td>*Must be three or more credits. For more information, refer to the Computer Science Undergraduate Handbook, available from 303 Upson Hall.</td>
<td></td>
</tr>
</tbody>
</table>

The performance of students in the Field of Computer Science is reviewed each term. To remain in good standing with the department, they must have an overall term average of at least 2.3 with no courses failed and a term average for field program courses of at least 2.7 with no course grade less than C−, and they must be making satisfactory progress in the field.

**Cooperative Program with the Johnson Graduate School of Management**

Undergraduates majoring in computer science may be interested in a program that can lead, in the course of six years, to B.S., M.Eng.(Computer Science), and M.B.A. degrees. This program, which is sponsored jointly by the College of Engineering and the Johnson Graduate School of Management, enables students to study several subjects required for the M.B.A. degree as part of their undergraduate curriculum. Planning must begin early, however, if all requirements are to be completed on schedule.

For further details and assistance in planning a curriculum, students should contact the assistant director of undergraduate programs in Upson Hall.

**Master of Engineering (Computer Science) Degree Program**

The one-year program leading to the degree of M.Eng.(Computer Science) admits forty to seventy students a year. A strong undergraduate background in computer science or a related field is required. Early admission is available for Cornell seniors who apply in the fall semester.

The emphasis of the curriculum can be on programming languages and systems or theory of algorithms and theory of computation or numerical analysis, artificial intelligence, or information processing, which includes databases and information organization and retrieval. The required design project could be, for example, the design of a compiler for a large subset of a general-purpose programming language, or the solution of a significant engineering problem using computer science techniques.

**ELECTRICAL ENGINEERING**


**Bachelor of Science Curriculum**

The undergraduate Field Program in Electrical Engineering provides a foundation that reflects the broad scope of this engineering discipline.

Concentrations include computer engineering; control systems; electronic circuit design; information, communication, and decision theory; microwave electronics; plasma physics; power and energy systems; quantum and optical electronics; radio and atmospheric physics; and semiconductor devices and applications.

**New Curriculum (starting with Class of 1998)**

Students planning to enter the Field Program in Electrical Engineering must take ELE E 230, Introduction to Digital Systems, as an engineering distribution course. The fall of the sophomore year is the preferred term for EE 230 for students without advanced standing in mathematics. Electrical engineering students with an interest in computer engineering are encouraged to take COM S 211 as an engineering distribution course prior to entry into the field program. In addition, the field program begins normally in the spring of the sophomore year, as shown below. All of these courses (except ELE E 210) are taught only once a year, either spring or fall, as indicated in the course descriptions.

- **Course**
- **Credits**

**Field Required Courses**

- **ELE E 210**, Introduction to Electrical Systems 3
- **ELE E 215**, Electrical Systems Laboratory 3
- **ELE E 301**, Electrical Signals and Systems I 4
- **ELE E 303**, Electromagnetic Waves and Fields I 4
- **ELE E 315**, Electrical Laboratory 4

A choice of three courses from among:

- **ELE E 302**, Electrical Signals and Systems II 4
- **ELE E 304**, Electromagnetic Waves and Fields II 4
- **ELE E 306**, Fundamentals of Quantum and Solid State Electronics 4

**ELE E 308**, Fundamentals of Computer Engineering 4

**ELE E 310**, Probability and Random Signals* 4

**Field Elective Courses**

Electrical Engineering Approved Electives 12
Electives Outside Field† (3 courses) 9
Total minimum field credits 51

*ELE E 310 can be taken in place of ENGRD 260 or 270 or TAM 310 to satisfy the college application of probability and statistics requirement.
†Must include two electrical engineering laboratory courses and at least one course at the 400-level or above.

See Electrical Engineering Handbook for detailed definitions, but must include one course at the 300-level or above. At least one of the required electrical engineering laboratory courses must be selected from a list including ELE E 320, 425, 430, 453, 457, 475, 476, 488, 497 and 530. The other may be selected from the above list or from among ELE E 423, 426, 433, 451, 452, 471, 472, 481, 526, 526, 539, 554, and 558.

All students graduating with a B.S. degree must fulfill the engineering design requirement. To meet this requirement, students must demonstrate that they have completed courses that contain at least 16 credits of engineering design. A table listing the engineering design content of all relevant electrical engineering and computer science courses is available in the electrical engineering undergraduate program office.

Undergraduate specialization is achieved through the various electrical engineering elective courses, as well as other courses in related technical fields within engineering, mathematics, the physical sciences, and the analytical biological sciences. The School of Electrical Engineering offers more than thirty courses that are commonly taken as electives by undergraduates.

Maximum technical course scheduling flexibility in the field program is preserved only for those students who do not complete their 6 credits of college approved electives prior to entry into the field program. Accordingly, intended electrical engineering students are advised to consider course selection carefully during their first three terms in engineering.

An electrical engineering honors program also exists for those students who so desire and meet the program entrance requirements. The honors program requires additional courses, a required undergraduate research or design project, or an honors thesis. Details are available in the 1995-96 Electrical Engineering Handbook.

Students with advanced standing frequently take one or more graduate-level courses prior to graduation and may actually begin the Master of Electrical Engineering program in their last semester of undergraduate course work so long as 8 or fewer credits remain toward B.S. degree requirements and a 3.0 GPA has been maintained. Admission must be approved in advance of this last semester of undergraduate work.

All students majoring in electrical engineering are expected to meet the following academic standards:
1. Students must achieve a grade-point average of at least 2.3 every semester.

2. No course with a grade of less than C- may be used to satisfy degree requirements in the field program or serve as a prerequisite for a subsequent electrical engineering course.

3. Students must complete satisfactorily ELE E 210, ELE E 215, MATH 294, and PHYS 214 by the end of the first semester in the Field Program of Electrical Engineering and make adequate progress toward the degree in subsequent semesters.

4. Honors program students must meet the GPA and progress requirements specified in the Electrical Engineering Handbook to remain active participants.

**Master of Engineering (Electrical) Degree Program**

The M.Eng. (Electrical) degree program prepares students either for professional work in electrical engineering and closely related areas or for further graduate study in a doctoral program. The M.Eng. degree differs from the Master of Science degree mainly in its emphasis on engineering design and analysis skills rather than basic research.

The program requires 30 credits of advanced technical course work, including a minimum of four courses in electrical engineering. An electrical engineering thesis project is also required and may account for 3 to 8 credits of the M.Eng. program. Occasionally, students take part in very extensive projects and may apply for a waiver of the 8-credit maximum and increase the project component to 10 credits. Students with special career goals, such as engineering management, may apply to use up to 8 credits of approved courses that have significant technical content, but are taught in disciplines other than engineering, mathematics, or the physical sciences.

Although admission to the M.Eng.(Electrical) program is highly competitive, all well-qualified students are urged to apply. Further information is available from the Master of Electrical Engineering Program Office in 222 Phillips Hall.

**GEOLOGICAL SCIENCES**


**Bachelor of Science Curriculum**

Study in geological sciences is offered for engineering students who are preparing for careers in earth sciences and for those who want a broad background in the geological sciences as preparation for careers in other engineering fields. 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. The Department of Geological Sciences is also taking part in a new intercollege program in the Science of Earth Systems, which will be available to students in the Colleges of Arts and Sciences, Engineering, and Agricultural and Life Sciences beginning fall 1995. This program, which is being developed as a new intercollege major, will emphasize a strong preparation in mathematics and sciences and an integrated approach to the study of the earth system including the lithosphere, biosphere, hydrosphere, and atmosphere.

The aim is to prepare students for graduate study and careers across the broad spectrum of earth sciences required for successful understanding and management of our planet. For a description of the program and proposed requirements for the major, see the section, Interdisciplinary Centers, Programs, and Studies, in the front part of the catalog.

All geology majors take substantially the same set of upper-level geology courses regardless of their college affiliation. The difference between the curricula for students in engineering (B.S.-degree candidates) and those in arts and sciences (B.A.-degree candidates) is in their respective college requirements such as distribution courses, languages, social sciences, and humanities requirements. Both B.S.- and B.A.-degree programs stress a balanced overview of earth science, without specialization. Within the B.S.-degree program, substantial specialization can be achieved by careful selection of field approved electives.

Students in the College of Engineering who may wish to affiliate with the Field Program of Geological Engineering may take ENGRD 122 and ENGRD 201 as distribution courses. As a prerequisite for the major, they should take GEOL 201 (ENGRD 201) or GEOL 101 or 103 as a field approved elective, preferably during their freshman or sophomore year. For those interested in geobiology, BIO G 101-103 and 102-104 are recommended. Chemistry 208 may be substituted for PHYS 214 with approval of the adviser.

Geological Sciences requires the following courses for the engineering major: GEOL 210, 214, 255, 256, 275, and 388. GEOL 210 plus 214 count as one course for purposes of graduation requirements. At least two field approved electives should be GEOL 400 or 600-level courses.

In addition, a requirement for field experience may be met by completing one of the following: (a) GS 491–492 (Undergraduate Research) based on field work (2-credit minimum); (b) GS 437 (Geophysical Field Methods) as an additional field approved elective (3 credits); (c) An approved field course taught by another college or university (3 credit minimum); (d) GS 212 (Special January Field Trip) (2 credits). Field observations made during GS 212 could be the basis for GS 491–492.

Core courses may be taken in any reasonable sequence, except that GEOL 355, which is offered in the fall, should be taken before GEOL 356, which is offered in the spring. GEOL 326, 355, 356, and 375 should be taken relatively early in the major program.

It is recommended that students intending to specialize in geophysics select most of their field approved electives from the appropriate advanced geology courses and the following courses or their equivalents; these guidelines also apply to the students’ choice of other electives outside the major field.

- GEOL 204 (also SCAS 371 and ABEN 371), Hydrology and the Environment
- ABEN 475, Environmental Systems Analysis
- ABEN 671, Analysis of the Flow of Water and Chemicals in Soils
also complete a design project, worth between 3 and 12 credits, that has a significant geological component and results in substantial conclusions or recommendations. General information on admission and degree requirements for the M.Eng. degree is programs can be found in the college’s introductory section.

MATERIALS SCIENCE AND ENGINEERING


Bachelor of Science Curriculum

Students majoring in materials science and engineering are required to take MS&E 261, Introduction to Mechanical Properties of Materials, or MS&E 262, Introduction to Electrical Properties of Materials, before affiliating with the field. They are strongly urged to take it as an engineering distribution course during their sophomore year. Students in materials science and engineering must concentrate in a specialization which may cover an area such as materials science, solid state, metallic materials, ceramic materials, polymeric materials, or electronic materials. Specialization is achieved through the selection of technical electives in the junior and senior years. Optional research involvement courses provide undergraduates with the opportunity to work with faculty members and their research groups on current projects. The requirements for a Bachelor of Science degree in Materials Science and Engineering are:

1. Completion of common curriculum including humanities and social sciences.
2. Completion of 11 required field courses below:
   MS&E 331, Structural Characterization of Materials
   MS&E 332, Electrical and Magnetic Properties of Materials
   MS&E 335, Thermodynamics of Condensed Systems
   MS&E 336, Kinetics, Diffusion, and Phase Transformations
   MS&E 441, Microprocessing of Materials
   MS&E 442, Macroprocessing of Materials
   MS&E 433/435, Senior Materials Laboratory I or Senior Thesis I
   MS&E 444/435, Senior Materials Laboratory II or Senior Thesis II
   MS&E 445, Mechanical Properties of Materials
   MS&E 447 & 448, Materials Design Concepts I & II
3. Four courses in a technical specialization.
4. Twelve credits of other electives.
5. One of the elective or specialization courses must include substantial chemical synthesis (e.g., MS&E 414, MS&E 452, CHEM 208 or CHEM 253).

To continue in good standing in the Field of Materials Science and Engineering, students must

1) Maintain an overall 2.0 term average.
2) Maintain an average of 2.3, with no grade below C, in the department's core curriculum.
3) Completion of MS&E 261 or 262 with a minimum grade of C prior to affiliation.

The department’s core curriculum consists of all the required MS&E courses including MS&E 261 or 262 and the four courses comprising the student's area of specialization.

An attractive and very challenging program combines the materials science and engineering curriculum with that of either electrical engineering or mechanical engineering, leading to a double major. The combination of materials science and engineering is particularly well suited to students who will eventually be employed in the electronic materials industry. Mechanical engineers knowledgeable in materials science also will be well equipped for technical careers. Curricula leading to the double-major degree must be approved by both of the departments involved. Students are urged to plan such curricula as early as possible.

Master of Engineering (Materials) Degree Program

Students who have completed a four-year undergraduate program in engineering or the physical sciences can be considered for admission into the M.Eng.(Materials) program. This program consists of 30 credits, including course work and a master's design project. The project, which requires individual effort and initiative, is carried out under the supervision of a faculty member. Twelve credits are devoted to the project, which is normally experimental in nature, although analytical projects are also possible. Courses for the additional 18 credits are selected from the graduate-level classes in materials science and engineering and from other related engineering fields approved by the faculty. Typically half of the courses are from MS&E. One 3-credit technical elective must include advanced mathematics (modeling, computer application, or computer modeling), beyond the MS&E undergraduate requirements.

MECHANICAL AND AEROSPACE ENGINEERING


Members of the faculty of the graduate Fields of Aerospace Engineering and Mechanical Engineering are listed in the Announcement of the Graduate School.
Bachelor of Science Curriculum in Mechanical Engineering

The upperclass Field Program in Mechanical Engineering is designed to provide a broad background in the fundamentals of this discipline as well as to offer an introduction to the many professional and technical areas with which mechanical engineers are concerned. The program covers both major streams of the field of mechanical engineering: Mechanical systems, design, and materials processing is concerned with the design, analysis, testing, and manufacture of machinery, vehicles, devices, and systems. Particular areas of concentration are mechanical design and analysis, vehicle engineering, biomechanics, and materials processing and precision engineering. Other topics covered are computer-aided design, vibrations, control systems, and dynamics.

Engineering of fluids, energy, and heat transfer systems is concerned with the efficient conversion of energy in electric power generation and aerospace and surface transportation, the environmental impact of engineering activity (including pollutants and noise), and the experimental and theoretical aspects of fluid flow, heat transfer, thermodynamics, and combustion. Specific areas of concentration include aerospace engineering, heat, energy, and power engineering; and thermo-fluid sciences.

The undergraduate program is a coordinated sequence of courses beginning in the sophomore year. During the fall term sophomore students who plan to enter the Mechanical Engineering Program take ENGRD 202 (also T&AM 202) as an engineering distribution course. They also are urged to take ENGRD 221 (also M&AE 221), which is a field requirement that may simultaneously satisfy Common Curriculum requirements as an engineering distribution course. Occasionally because of study abroad or requirements for second majors or pre-med, students cannot complete all of the required sophomore courses on schedule. In such cases students should delay ENGRD 221 until the first semester of the junior year. The Sibley School is supportive of students with unusual requirements, but any delays or substitutions must be discussed with and receive approval from the student’s adviser.

The requirements for the degree of Bachelor of Science in Mechanical Engineering are as follows:

1. Completion of the Common Curriculum. During the upperclass years this will typically mean earning credit for five humanities or social science courses.
2. Completion of the field requirements, which consist of eleven required courses (beyond ENGRD 202 already mentioned), and five elective courses (24 credits).

The eleven required courses are:

- M&E 212, Mechanical Properties and Processing of Engineering Materials
- M&AE 221, Introduction to Thermodynamics
- M&AE 225, Mechanical Design and Synthesis
- T&AM 203, Dynamics
- ELE E 210, Introduction to Electrical Systems
- M&AE 323, Introduction to Fluid Mechanics
- M&AE 324, Heat Transfer
- M&AE 325, Mechanical Design and Analysis
- M&AE 326, System Dynamics
- M&AE 427, Fluids/Heat Transfer Laboratory
- M&AE 428, Engineering Design

Electives

Students should use the flexibility provided by the field approved electives, approved electives, and humanities/social sciences electives to develop a program to meet their specific goals.

Field Approved Electives

The upper-level program includes five field approved electives. Using these five courses, the student must satisfy the following requirements.

At least three of the courses must be upper-level (300+) M&AE courses. Of these three, two must satisfy a concentration chosen by the student.

Typically these are two courses chosen from an appropriate subset of the school’s upper-class offering. However, students can petition for approval of two related courses to form a custom concentration.

The standard concentrations are:

- Fluids/Aerospace Engineering, M&AE 305, 423, 506, 507
- Thermo-Fluids M&AE 423, 449, 506, 545
- Materials Processing M&AE 412, 414
- Mechanical Systems M&AE 389, 465, 469, 478, 489
- Vehicle Engineering M&AE 386, 449, 486, 506, 507

Of the three upper-level M&AE courses, one must be an approved design elective. The design offerings may change from year to year. Typically this list includes M&AE 401, 464, 486, and 489.

Note that the design elective must be taken during the senior year. Note that a single course may satisfy both the design and concentration requirements, in which case the third course could be any upper level M&AE course.

One of the courses must be an approved upper-level mathematics course taken after Math 284. The course must include some material on statistics. Currently, the approved courses are T&AM 310 and OR&E 270.

One of the field approved electives can be viewed as a technical elective and can be any course at an appropriate level, chosen from engineering, mathematics, or science (physics, chemistry, or biological sciences). Appropriate level is interpreted as being at a level beyond the required courses of the college curriculum. Note that courses in economics, business, and organizations are not acceptable. Advisers may approve such courses as approved electives.

Approved Electives

To maximize flexibility (i.e., the option for study abroad, COOP, internships, pre-med, and flexibility during the upper-class years), the Sibley School faculty recommends that students delay use of approved electives until after term three. The faculty encourages students to consider the following as possible approved electives:

- any engineering distribution course
- course stressing oral or written communications
- courses stressing the history of technology
- rigorous courses in the physical sciences (physics, biology, chemistry)
- courses in informational science (mathematics, computer science)
- courses in methodologies (modeling, problem solving, synthesis, design)
- course in technology (equipment, machinery, instruments, devices, processes)
- courses in business enterprise operations (economics, financial, legal, etc.)
- courses in organizational behavior
- courses in cognitive sciences.

Recommendation on Humanities/Social Sciences Electives

Students are encouraged to build a program that includes studies in:

- history of technology
- societal impacts of technology
- history
- foreign languages
- ethics
- communications
- political science
- aesthetics
- economics
- architecture

An additional graduation requirement of the field program is proof of elementary competence in technical drawing. The demonstration of competence is expected before completion of M&AE 325, Mechanical Design and Analysis. This proof may be given in a number of ways, including satisfactory completion of:

- a technical drawing course in high school or in a community college,
- ENGRG 102, Drawing and Engineering Design,
- another technical drawing course at Cornell, or
- a departmental examination.

The computer applications requirement of the Common Curriculum may be satisfied by several courses, including M&AE 389 or 489. The writing requirement of the Common Curriculum is satisfied by M&AE 427.

Introduction to Electronic Systems (ELE E 210) may be replaced or supplemented by Introductory Electronics (PHYS 360).

A limited set of third-year courses is offered each summer under the auspices of the Engineering Cooperative Program.

Applicability:

The curriculum requirements described above apply to the Class of '98 and beyond. Graduates of the Classes of 96, and '97 may choose to complete their studies under the previous requirements or those described above. Generally the Sibley School expects the Classes of '96 and '97 to use the
of Cornell engineering undergraduates if they have not already done so before enrolling the program. Courses in advanced engineering mathematics or statistics are particularly recommended.

Students should check with the M&AE graduate field office (104 Upson Hall) for additional degree requirements.

**Master of Engineering (Mechanical) Degree Program**

The M.Eng. (Mechanical) degree program provides a one-year course of study for those who wish to develop a high level of competence in engineering science, 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 include biomechanical engineering, combustion, energy and power systems, fluid mechanics, heat transfer, materials and manufacturing engineering, mechanical systems and design, CFD, CAE, CAD, CAM, etc.

A coordinated program of courses for the entire year is agreed upon by the student and the faculty adviser. This proposed program, together with a statement of purpose, is submitted for approval to the M&AE Master of Engineering Committee during the first week of class; any subsequent changes must also be approved by the committee. An individual student’s curriculum includes a 4- to 8-credit design course, a major concentration consisting of a minimum of 12 credits, and sufficient technical electives to meet the total degree requirement of 30 credits (of which at least 28 credits must have letter grades).

The design projects may arise from individual faculty and student interests or from collaboration with industry. All projects must have an aerospace engineering design focus and have the close supervision of a faculty member.

The courses that constitute the major concentration must be graduate-level courses in aerospace engineering or a closely related field such as theoretical and applied mechanics. In general, all courses must be beyond the level of those required in an undergraduate engineering program; credit may be granted for an upper-level undergraduate course if the student has done little or no previous work in that subject area, but such courses must have the special approval of the M&AE 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 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 to satisfy the requirements of the Manufacturing, Energy, or Electronic Packaging option programs leading to special dean’s certificates in those areas.

**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, V. O. Kostroun, and S. C. McGuire.

**Undergraduate Study**

Although there is no special undergraduate field program in nuclear science and engineering, students who intend to enter graduate programs in this area are encouraged to begin specialization at the undergraduate level. This may be done by choice of electives within regular field programs (such as those in engineering physics, materials science and engineering, and civil, chemical, electrical, or mechanical engineering) or within the College Program.

**Master of Engineering (Nuclear) Degree Program**

The two-term curriculum leading to the M.Eng.(Nuclear) degree is intended primarily for individuals who want a terminal professional degree, but it may also serve as preparation for doctoral study in nuclear science and engineering. The course of study covers the basic principles of nuclear reactor systems with a major emphasis on reactor safety and radiation protection and control. The special facilities of the Ward Laboratory of Nuclear Engineering are described in the Announcement of the Graduate School.

The interdisciplinary nature of nuclear engineering allows students to enter from a variety of undergraduate specializations. The recommended background is (1) an accredited baccalaureate degree in engineering, physics, or applied science; (2) physics, including atomic and nuclear physics; (3) mathematics, including advanced calculus; and (4) thermodynamics. Students should see that they fulfill these requirements before beginning the program. In some cases, deficiencies in preparatory work may be made up by informal study during the preceding summer. General admission and degree requirements are described in the college’s introductory section.

The following courses are included in the 30-credit program.

**Fall term**

- NS&E 509, Nuclear Physics for Applications
- A&EP 612, Nuclear Reactor Theory
- A&EP 633, Nuclear Engineering
- Technical elective

**Spring term**

- A&EP 651, Nuclear Measurements Laboratory
- NS&E 545, Energy Seminar
- Technical elective
Engineering design project
Mathematics or physics elective
Engineering electives should be in a subject area relevant to nuclear engineering, such as energy conversion, radiation protection and control, feedback control systems, magnetohydrodynamics, controlled thermonuclear fusion, and environmental engineering. The list below gives typical electives.

M&AE 651, Advanced Heat Transfer
ELE E 581, Introduction to Plasma Physics
ELE E 582, Advanced Plasma Physics
ELE E 589, Magnetohydrodynamics
ELE E 471, Feedback Control Systems
ELE E 472, Digital Control Systems
AE&EP 638, Intense Pulsed Electron and Ion Beams: Physics and Technology
AE&EP 661, Microcharacterization
NS&E 484, Introduction to Controlled Fusion: Principles and Technology
MS&IE 459, Physics of Modern Materials Analysis

Program for Applications of Nuclear Analytical Methods (PANAM)
This new program was initiated in 1993-94. It provides for specialization by Ph.D. candidates with either a major or a minor in NS&E. For those with majors in non-nuclear fields who expect to use nuclear analytical methods in their research, the sequence NS&E 509-551-590 forms a suitable minor in NS&E. The laboratory course 551 has been offered since spring 1989. The lecture course 509, offered for the first time in 1993, covers nuclear physics without requiring quantum mechanics as a prerequisite. For NS&E majors, PANAM offers the opportunity to extend and develop new nuclear-analytical methods, for example, uses of cold neutrons and neutron-depth profiling with conversion electrons. They would normally follow the M.Eng. program in the first year, continue with advanced courses in the second year (including a full quantum-mechanical treatment of nuclear physics), and begin, as early as possible, independent projects as precursors to thesis research.

OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING

Bachelor of Science Curriculum in Operations Research and Engineering
The program is designed to provide a broad and basic education in the techniques and modeling concepts needed to analyze and design complex systems and to provide an introduction to the technical and professional areas with which operations researchers and industrial engineers are concerned. Exceptional students interested in pursuing graduate studies are encouraged to speak with their faculty advisers concerning an accelerated program of study.

A student who intends to enter the Field Program in Operations Research and Engineering should plan to take Basic Engineering Probability and Statistics (ENGRD 270) immediately after completing Math 192. Early consultation with a faculty member of the school or with the associate director for undergraduate studies can be helpful in making appropriate choices. The required courses for the OR&E field program and the typical terms in which they are taken are as follows:

**Term 5**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 310, Industrial Systems Analysis</td>
<td>4</td>
</tr>
<tr>
<td>CS 211, Computers &amp; Programming</td>
<td>3</td>
</tr>
<tr>
<td>OR&amp;IE 320, Optimization I</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 350, Cost Accounting, Analysis, and Control</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 360, Engineering Probability and Statistics II</td>
<td>4</td>
</tr>
<tr>
<td>A course in humanities and social sciences</td>
<td>3</td>
</tr>
<tr>
<td>A non-OR engineering course</td>
<td>3</td>
</tr>
</tbody>
</table>

**Term 6**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 321, Optimization II</td>
<td>4</td>
</tr>
<tr>
<td>OR&amp;IE 361, Introductory Engineering Stochastic Processes</td>
<td>4</td>
</tr>
<tr>
<td>Behavioral science</td>
<td>3</td>
</tr>
<tr>
<td>Course in humanities and social sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

The behavioral science requirement can be satisfied by any one of several courses, including the Johnson Graduate School of Management (JGSM) course, NCC 504 (offered only in the fall), which is recommended for those contemplating the pursuit of a graduate business degree, and Industrial and Labor Relations 170, 171, 320, and 461. The adviser must approve the selection in all cases.

The basic senior-year program, from which individualized programs are developed, consists of the following courses:

<table>
<thead>
<tr>
<th>Minimum credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 580, Digital Systems Simulation</td>
</tr>
<tr>
<td>Three upperclass OR&amp;E electives as described below</td>
</tr>
<tr>
<td>Two non-OR electives</td>
</tr>
<tr>
<td>Two courses in humanities and social sciences</td>
</tr>
<tr>
<td>Two approved electives</td>
</tr>
</tbody>
</table>

**Available OR&E electives as follows:**

Manufacturing and distribution systems: OR&IE 416, 417, 451, 480, 516, 525, and 562 and JGSM MBA 601 and 641*

Optimization methods: OR&IE 431, 432, and 435

Applied probability and statistics: OR&IE 462, 475 (2 credits), 476 (2 credits), 561, 563, 575, and 577

*No more than one course in the Johnson Graduate School of Management may be taken as an OR&E elective.

Scholastic requirements for the field are a passing grade in every course, an overall average of at least 2.0 for each term the student is enrolled in the school, an average of 2.0 or better for OR&E field courses, and satisfactory progress toward the completion of the degree requirements. The student's performance is reviewed at the conclusion of each term.

**Master of Engineering (OR&IE) Degree Program**

This one-year professional degree program stresses applications of operations research and industrial engineering and requires completion of a project. The course work centers on additional study of analytical techniques, with particular emphasis on engineering applications, especially in the design of new or improved man-machine systems, information systems, and control systems.

General admission and degree requirements are described in the introductory "Degree Programs" section. The M.Eng.(OR&IE) program is integrated with the undergraduate Field Program in Operations Research and Engineering. Also welcome are requests for admission from Cornell undergraduates in engineering programs other than OR&E or from qualified non-Comellians. To ensure completion of the program in one calendar year, the entering student should have completed courses in statistics and in computer programming (Pascal or C).

Students interested in the manufacturing engineering option should obtain further information regarding program requirements from the office of the Center for Manufacturing Enterprise, 103 Engineering and Theory Center Building. Information concerning industrial internships can be obtained from the Master of Engineering Program Office, Olin Hall.

1. For matriculants with preparation comparable to that provided by the undergraduate Field Program in Operations Research and Engineering:

<table>
<thead>
<tr>
<th>Fall term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 516, Case Studies</td>
<td>1</td>
</tr>
<tr>
<td>OR&amp;IE 893, Applied OR&amp;IE Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>OR&amp;IE 599, Project</td>
<td>1</td>
</tr>
<tr>
<td>Three technical electives</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring term</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR&amp;IE 894, Applied OR&amp;IE Colloquium</td>
<td>1</td>
</tr>
<tr>
<td>OR&amp;IE 599, Project</td>
<td>minimum of 4</td>
</tr>
<tr>
<td>Three technical electives</td>
<td>9</td>
</tr>
</tbody>
</table>

At least 12 credit hours of the electives specified above must be chosen from the list of courses offered by the School of Operations Research and Industrial Engineering. Other restrictions apply. A minimum of 30 credits must be taken to complete the program.

II. For matriculants from other fields who minimally fulfill the prerequisite requirements (students who have the equivalent of OR&IE 520, 523, and 570 will take technical electives in their place):
STATISTICS CENTER
The Cornell Statistics Center coordinates university-wide activities in statistics and probability at the graduate and research level. Students interested in graduate study in statistics and probability should apply to the Field of Statistics or to one of the other graduate fields that offer related coursework.
A list of courses in statistics and probability suitable for graduate students in the Field of Statistics is given under the heading "Statistics Center" in the section "Interdisciplinary Centers and Programs" at the front of this book. Further information can be obtained from the director of the Statistics Center, Professor S. R. Searle, or from the graduate field representative for statistics, Professor M. Wells, both at 482 Caldwell Hall.

THEORETICAL AND APPLIED MECHANICS

Undergraduate Study
The Department of Theoretical and Applied Mechanics is responsible for courses in engineering mechanics and engineering mathematics, some of which are part of the Common Curriculum.

College Program in Engineering Science
A student may enroll in the College Program in Engineering Science, which is sponsored by the Department of Theoretical and Applied Mechanics. The College Program is described in the section on undergraduate study in the College of Engineering.

Master of Engineering (Engineering Mechanics) Degree Program
Composite materials designed to meet specific requirements of weight, strength, and rigidity are used increasingly in the manufacture of everyday structures and components. The Master of Engineering (Engineering Mechanics) degree program focuses on the mechanical behavior of advanced composite materials and structures and prepares students to play a role in the development of this new technology. Students from diverse engineering backgrounds, such as mechanics, structures, and materials, as well as aerospace and biomedical engineering, can normally complete the requirements for the professional Master of Engineering degree in one year.

Students usually select courses totaling 20 credits, which may be chosen from four different departments. These courses explore the nature of modern composite materials, provide a background in the fundamentals of these materials and their mechanics, and introduce techniques that will be useful in subsequent work. The program offers a series of topical, four-week mini courses on specialized subjects related to composites, taught by experts in the field. The degree program requires satisfactory completion of 30 credits of course work, including 12 credits of courses that involve analysis, computation, design, or laboratory experience. Of these 12 credits, at least 6 must be earned in T&AM 501, 502 (Topics in Composites I, II), 555 (Introduction to Composite Materials), or 655 (Advanced Composite Materials and Structures). Up to 10 credits will be awarded for an individual project involving composites. The balance of the required credits may be earned in elective courses chosen from those in the course listing below or others approved by the student's adviser.

The Department of Theoretical and Applied Mechanics has several laboratories equipped for the fabrication and mechanical testing of composite materials and structures. Extensive computing resources are available for numerical computations, design, or other numerical- or simulation-research activities related to composites. The Materials Science Center, the Center for Theory and Simulation in Science and Engineering, and the Computer-Aided Design Instructional Facility provide additional state-of-the-art laboratories and computer resources. Core courses in the M.Eng.(Engineering Mechanics) program are:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>T&amp;AM 555, Introduction to Composite Materials</td>
<td>3</td>
</tr>
<tr>
<td>T&amp;AM 655, Advanced Composite Materials and Structures</td>
<td>4</td>
</tr>
<tr>
<td>T&amp;AM 663, Solid Mechanics I</td>
<td>4</td>
</tr>
<tr>
<td>T&amp;AM 501, Topics in Composites I</td>
<td>1-3</td>
</tr>
</tbody>
</table>

Selected from the following:
- Analysis of Composite Structures
- Mechanical Testing of Composite Constituents
- Fracture Testing of Composites
- Reliability Models for Composites
- Design Principles for Composite Structures
- Biological Composites

T&AM 502, Topics in Composites II 1-3

Selected from the following:
- Effective Properties of Composites
- Interface Failure and Fracture Processes in Composites
- Boundary-Element Methods for Composites
- Nondestructive Testing of Composites
- Software for Composite Design
- Novel Composite Structures

T&AM 591, Master of Engineering Design Project I 3-5

T&AM 592, Master of Engineering Design Project II 5-10

Complementary courses from other departments include:
- MS&E 450, Physical Metallurgy 3
- MS&E 452, Properties of Solid Polymers 3
- MS&E 605, Plastic Flow and Fracture of Materials 3
M&AE 465, Biomechanical Systems—Analysis and Design 3
M&AE 569, Mechanical and Aerospace Structures 3
M&AE 670, Mechanical and Aerospace Structures II—Finite-Element Methods 4
CEE 770, Engineering Fracture Methods 3
CEE 772, Finite-Element Analysis 3

ENGINEERING COURSES

Courses offered in the College of Engineering are listed under the various departments and schools.

Courses are identified with a standard abbreviation followed by a three-digit number.

Introduction to Engineering ENGR 1
Engineering Distribution ENGRD
Engineering General Interest ENGRG
Engineering Communications ENGRC
Agricultural and Biological Engineering ABEN
Applied and Engineering Physics A&EP
Chemical Engineering CHEME
Civil and Environmental Engineering CEE
Computer Science COM S
Electrical Engineering ELE E
Geological Sciences GEOL
Materials Science and Engineering MS&E
Mechanical and Aerospace Engineering M&AE
Nuclear Science and Engineering NS&E
Operations Research and Industrial Engineering OR&IE
Theoretical and Applied Mechanics T&AM

ENGINEERING COMMON COURSES

Courses of General Interest

Courses in this category are of general interest and cover technical, historical, and social issues relevant to the engineering profession. These courses may also include seminar or tutorial type courses.

ENGRG 101 The Computer Age (also COM S 101) Summer. 3 credits. Not offered every year. Credit is granted for both COM S 100 and 101 only if 101 is taken first.
An introduction to computer science and programming for students in nontechnical areas. The aims of the course are to acquaint the student with the major ideas in computer science and to develop an appreciation of algorithmic thinking. Topics may include the history of computation, microtechnology, the retrieval and transmission of information, scientific computing, computer graphics, art, and music; robotics, natural-language processing, and machine intelligence. Students become acquainted with the notion of an algorithm by writing several programs in Pascal or Scheme and testing them on microcomputers. The amount of programming is about half that taught in Engr 100.

ENGRG 102 Drawing and Engineering Design (also M&AE 102) Fall, spring. 1 credit. Half-term course offered twice each semester. Enrollment limited to thirty students each half term. Recommended for students without previous technical drawing experience. S-U grades optional.
Introduction to sketching, drawing, and graphic techniques useful in design, analysis, and presentation of ideas. Use of computer-aided drafting software is introduced in the final design project.

ENGRG 150 Engineering Seminar Fall. 1 credit. First-year students only. S-U grades only.
Weekly discussions with selected faculty advisers to give students information about the various fields of engineering and related career opportunities. Topics may include recent science and engineering developments, applications of engineering principles, and a view of campus resources. Visits to campus academic and research facilities may be included.

ENGRG 250 Technology in Western Society (also ELE E 250) Fall. 3 credits. Meets liberal studies distribution requirement.
An investigation of the history of technology in Western society from the ancient Egyptian times to the present, focusing on Western Europe up to the British industrial revolution in the late eighteenth century, and on the United States thereafter. Topics include the economic and social aspects of industrialization; the myths of heroic inventors like the Edison, Ford, the government's promotion and regulation of technology through such measures as the patent system, the funding of research and development, and regulatory legislation; the origins of modern systems of mass production; and the automobile and microelectronics cultures in the United States.

ENGRG 290 Engineering in Europe Spring. 2 credits. Open only to participants in the Semester in Europe Program. S-U grades only.
A specially designed course for students in residence in Hamburg, Germany. Weekly seminars associated with approximately ten weekly field trips to engineering sites in and around Hamburg. Students will be required to maintain written journals of field trips, prepare memos to the record of field trips, assemble associated readings, as well as present oral reports on selected industries. A term paper is required. No unexcused absences.

ENGRG 298 The Electrical and Electronic Revolutions (also ELE E 298) Spring. 3 credits. Approved for humanities distribution, not as field electives.
Explores the history of electricity in society from the 1830s to the present by considering the technical and social history of telecommunication, the electric-power industry, microelectronics, radio, television, and computers. Emphasis is placed on the changing relationship between science and technology, the institutional context of research and development, the economic aspects of innovation, and the social relations of this technology.

ENGRG 323 Engineering Economics and Management (also CEE 323) Spring. 3 credits. Primarily for juniors and seniors. R. E. Schuler.
Introduction to engineering and business economics and to project management. Intended to give students a working knowledge of money management and how to make economic comparisons of alternative engineering designs or projects. The impact of inflation, taxation, depreciation, financial planning, economic optimization, project scheduling, and legal and regulatory issues are introduced and applied to economic investment and project-management problems.

ENGRG 356 Women in Engineering Career Planning Seminar Spring. 1 credit. Limited to 25 students. S-U grades only. Open to juniors and seniors in engineering and related fields or permission of instructor.
Covers aspects of transition to the engineering profession and related issues especially of interest to women. Topics include career and life planning, the job-search process, interviewing strategies, juggling career and family, graduate education, sexual harassment and sexism in the workplace, professionalism, and networking. Corporate professionals and Cornell faculty and staff participate in class discussions.

ENGRG 360 Ethical Issues in Engineering Spring. 3 credits. A social-sciences elective for engineering students. Open to juniors and seniors.
A discussion of ethical issues encountered in engineering practice, such as the rights of engineers in corporations, responsibility for harmful actions, whistleblowing, conflicts of interest, and decision making based on cost-benefit analysis. Codes of ethics of professional engineering societies and ethical theory will be used to help sort out conflicting obligations the engineer may feel toward public safety, professional standards, employers, colleagues, and family. Students will present a case study to the class, along the lines of the Space-Shuttle Challenger disaster, the Kansas City Hyatt-Regency Hotel walkway failure, or the Cornell computer "worm."

ENGRG 461 Engineering for Entrepreneurs Fall. 3 credits.
Intent is to provide students with the tools and skills necessary to identify, evaluate, and undertake new business ventures. A major course project will be the development of a business plan for an innovative new venture and will require the detailing of manufacturing, support, and information systems as well as staffing and cost data. Intended for juniors and seniors in the College of Engineering, this course is open to all undergraduates.

ENGRG 501 Bioengineering Seminar Fall, spring. 1 credit. Primarily for juniors, seniors, and graduate students.
M. L. Shuler.
Broad survey of all aspects of bioengineering, including biomedical, bioprocess, biological, and biochemical engineering and aspects of biotechnology. Sessions may be technical presentations or discussions.
Engineering Communications Courses

Courses in this category, offered by the Engineering Communications Program, develop writing and communications skills relevant to engineers.
ENGRC 233/433 Topics in Engineering Communications
TBA. 3 credits.
Topics vary as the need and interest arise. Offerings might include: introductory technical communications, graphic presentation of engineering material, desktop publishing, information technologies, advanced problems in engineering communications, technology and the law. Fulfills the college technical writing requirement.

ENGRC 234/434 Independent Study in Engineering Communications
TBA. Variable credits (1–3). Credit and course level (234 or 434) determined by the amount and intellectual level of the work.

Students work closely with a Communications Program instructor to pursue an aspect of professional communications not available through regular course work. Projects may involve writing technical documentation, creating user manuals, analyzing and producing technical graphics, or reading and writing about professional communication practice. Interested students should contact the Engineering Communications Program.

ENGRC 301 Writing in Engineering
TBA. 1 credit. Prerequisite: Permission of instructor. Can be used to satisfy requirements in expressive arts as a free or approved elective. This course can only be taken in conjunction with a "writing-intensive" engineering class.

Some "writing-intensive" engineering classes may require students to enroll in this supplementary course. Instructors from the Engineering Communications Program work with engineering faculty members to prepare students for writing assignments. Intended to strengthen understanding of the course content while enhancing communications skills. May be taken more than once, with different engineering courses.

ENGRC 350 Engineering Communications
Fall, spring, summer. 3 credits. Limited to 20 students per section.

Emphasizes technical and professional writing, also includes oral and visual presentation. Communications in real-life engineering contexts are analyzed, with case studies and assignments modeled on professional situations. Students learn to adapt language and formats—letters, memos, presentations, definitions, directions, reports—to audiences having different needs and levels of technical expertise. Students also consider the social and ethical implications of the communications they encounter and produce. Taught as a workshop, with ample time for discussion. The goal throughout is clear, well-organized, responsible, and forceful professional communication. Lab fee will be charged to cover photocopying costs. Fulfills the college technical writing requirement.

ENGRC 435 Communications for Engineering Managers
Fall, spring. 3 credits. Limited to 20 students per section.

Guidance and practice in professional writing and in developing effective responses to cases studies that replicate actual problems in industry. Learn techniques for planning and organizing action; controlling and monitoring progress; motivating, leading, coaching, and appraising co-workers; handling organizational power and politics; and managing conflict. Focus on issues such as writing successful proposals, managing engineering teams and projects, and communicating with lawyers, regulators, and the general public. Fulfills the college technical writing requirement. Lab fee will be charged to cover photocopying costs.

Introduction to Engineering Courses

Courses in this category are freshman-level courses intended to introduce students to various aspects of engineering. They have no prerequisites and are always cross-listed with a department.

ENGR 110 The Laser and Its Applications in Science, Technology, and Medicine (also A&EE 110)
Fall, spring. 3 credits.
The principles of laser action, types of laser systems, elements of laser design, and applications of lasers in science, technology, and medicine are discussed. In the laboratory students build and operate a nitrogen laser and a tunable dye laser. Demonstration experiments with several types of lasers illustrate phenomena such as holography, laser processing of materials, and Raman spectroscopy.

ENGR 111 Materials by Design (also M & AE 111)
Fall. 3 credits. E. P. Giannulis.
Explores the relationship between atomic structure and macroscopic properties of such diverse materials as metals, ceramics, polymers, and semiconductors. Hands-on project involves dissecting and analyzing various consumer products like a disposable camera or portable cassette player. Emphasis is placed on materials identification and their selection to perform an engineering function.

ENGR 112 Introduction to Chemical Engineering (also CHEM 112)
Fall, spring, summer. 3 credits. Limited to freshmen. T. M. Duncan, C. Cohen.
Design and analysis of processes involving chemical change. Strategies for design, such as creative thinking, conceptual blockbusting, and redefinition of the design goal, in the context of contemporary chemical engineering. Methods for analyzing designs, such as mathematical modeling, empirical analysis by graphics, and dynamic scaling through dimensional analysis, to assess product quality, economics, safety, and environmental issues.

ENGR 113 Environmental Systems Engineering (also CEE 113)
Fall. 3 credits. Not open (without instructor's permission) to upper-division engineering students, who should take CEE 120 instead. Staff.
Introduction to analysis, management, and modeling of environmental systems. Discussion of physical, chemical, and biological processes affecting environmental quality. Use of computer simulation of environmental phenomena. Examples include management of water resources, ecosystems concepts, solid waste management, and water quality in surface and ground waters.

ENGR 114 An Introduction to Electrical Engineering Design
Spring. 3 credits.
An introduction to electrical engineering and electronic circuit design. Students work in small groups on a series of electric circuit projects leading to the team design of a working fiber optic receiver system. The laboratories and lectures introduce the concepts and principles of electronic circuits and focus upon circuits useful in the design project. Laboratory fee required.

ENGR 115 Engineering Application of Operations Research (also ORIE 115)
Fall, spring. 3 credits.
An introduction to the problems and methods of Operations Research and Industrial Engineering focusing on problem areas (including inventory, network design, and resource allocation), the situations in which these problems can be found, and several standard solution techniques. In the computer laboratory, students will encounter problem simulations and use some standard software packages.

ENGR 116 Modern Structures (also CEE 116)
Fall. 3 credits. A. R. Ingraffea.
An introduction to the basic principles of structural engineering and to structural forms. Emphasis is placed on how various types of structures carry loads. Concepts are illustrated by a series of case studies of major structures such as spacecraft, skyscrapers, bridges, shell structures, and dams. The philosophy of engineering design and lessons learned from structural failures and earthquakes are discussed. A semester project involves the design and construction of a small balsa-wood bridge.

ENGR 117 Introduction to Mechanical Engineering (also M & AE 117)
Spring. 3 credits.
An introduction to topics of current interest in mechanical engineering. Specific topics vary from offering to offering. Students are urged to check in Upson 112 for details. In 1993, the course was "The Engine and the Atmosphere." This course discussed engines and their design including constraints imposed by the laws of thermodynamics, the combustion process, and the products of the exhaust. This led to a discussion of local and global environmental problems, including greenhouse warming. The dilemma of productivity versus environmental degradation and the engineer's role in this was also discussed. This offering was intended for students wishing to study mechanical engineering as well as environmental, chemical, and civil engineering.

ENGR 118 Design Integration: A Portable CD Player (also M & AE 118)
Spring. 3 credits.
This course will examine the roles of various engineering disciplines on the design of a portable compact disc (CD) player. Students will be introduced to elements of mechanical, electrical, materials, environmental, manufacturing, and computer engineering as related to the CD player. Laboratory sessions and demonstrations will be used to illustrate the principles of design.
An interdepartmental course on the application of technologies in society. The implications and uses of information technologies are intended to introduce students to the interplay between science, technology, and the engineer's profession and their effects on our culture. Development of scientific and engineering literacy for non-engineers.

Development of scientific and engineering-design principles in a variety of technological contexts. Overview of the development of engineering as a profession and the evolution of the design process. The relationship between science, technology, and engineering. Civil, mechanical, electrical, chemical, and other engineering project case studies. The implications and uses of information technologies in society.

ENGRD 201 Introduction to the Physics and Chemistry of the Earth (also GEOL 201)
Spring. 3 credits. Prerequisites: Mathematics 191 and Physics 112. L. M. Cathles. Formation of the solar system: accretion and evolution of the earth. The rock cycle: radioactive isotopes and the geological time scale, plate tectonics, rock and minerals, earth dynamics, mantle plumes; The hydrosphere: cyclogy, runoff, floods and sedimentation, groundwater flow, contaminant transport. Weathering cycle: chemical cycles, CO₂ (weathering), rock cycle, controls on global temperature; C0₂, or ocean currents), oil and mineral resources.

ENGRD 202 Mechanics of Solids (also T&AM 202)
Fall, spring. 3 credits. Prerequisites: T&AM 202. Newtonian dynamics of a particle, systems of particles, a rigid body. Kinematics, motion relative to a moving frame. Impulse, momentum, angular momentum, energy. Rigid-body kinematics, angular velocity, moment of momentum of the inertia tensor. Euler's equations, the gyroscope.

ENGRD 203 Dynamics (also T&AM 203)
Fall, spring. 3 credits. Prerequisite: T&AM 202, coregistration in Mathematics 204, or permission of instructor. Newtonian dynamics of a particle, systems of particles, a rigid body. Kinematics, motion relative to a moving frame. Impulse, momentum, angular momentum, energy. Rigid-body kinematics, angular velocity, moment of momentum of the inertia tensor. Euler's equations, the gyroscope.

ENGRD 210 Introduction to Electrical Systems (also ELE E 210)
Fall, spring. 3 credits. Corequisites: Mathematics 254 and Physics 215. Circuit elements and laws, analysis techniques, operational amplifiers. Response of linear systems, with an introduction to complex frequency and phasors, forced response, average power, transfer function, pole-zero concepts, and the frequency spectrum.

ENGRD 211 Computers and Programming
For description, see COM S 211.

ENGRD 212 Structure and Interpretation of Computer Programs
For description, see COM S 212.

ENGRD 219 Mass and Energy Balances (also CHEM E 219)
Fall. 3 credits. Corequisite: physical or organic chemistry or permission of instructor. C. Cohen. Engineering problems involving material and energy balances. Batch and continuous reactive systems in the steady and unsteady states. Introduction to phase equilibria for multicomponent systems. Humidification processes.

ENGRD 221 Thermodynamics (also M&E 221)
Fall, spring. 3 credits. Prerequisites: Mathematics 192 and Physics 112. The definitions, concepts, and laws of thermodynamics. Applications to ideal and real gases, multiphase pure substances, gaseous reactions, heat-engine and heat-pump cycles, with an introduction to energy-conversion systems.

ENGRD 222 Introduction to Scientific Computation
For description, see COM S 222.

ENGRD 230 Introduction to Digital Systems (also ELE E 230)
Fall, spring. 4 credits. Prerequisite: COM S 100. An introduction to basic principles and design techniques for digital systems such as computers and computer systems. Includes Boolean algebra, switching circuits, finite state machines, and system design methodology.

ENGRD 241 Engineering Computation (also CEE 241)
Fall, spring. 3 credits. Prerequisites: COM S 100 and Math 293. Co-requisite: Math 294. J. R. Stedinger, P. L.-F. Liu. This course introduces the discipline of numerical methods while developing programming and graphics proficiency with MATLAB and spreadsheets. Numerical analysis topics considered are accuracy, precision, Taylor-series approximations, truncation and round-off errors, condition numbers, operation counts, convergence, and stability. Included are numerical methods for solving engineering problems that entail roots of functions, simultaneous linear equations, regression, interpolation, numerical differentiation and integration, and ordinary differential equations. The context and solution of partial differential equations are also discussed. Applications are drawn from different areas of engineering.

ENGRD 261 Introduction to Mechanical Properties of Materials (also MS&E 261)
Fall. 3 credits. S. L. Sasse. The relationship of elastic deformation, plastic deformation, and fracture properties to structure and defects on a microscopic scale in metals, ceramics, polymers, and composite materials. Design and processing of materials to achieve high modulus, damping capacity, hardness, fracture strength, creep resistance, or fatigue resistance. Flaw-tolerant design methods using fracture mechanics.

ENGRD 262 Introduction to Electrical Properties of Materials (also MS&E 262)
Fall. 3 credits. Prerequisite: co-registration in PHYS 213 or electricity and magnetism in high school physics. M. O. Thompson.

Electrical and structural properties of semiconductors, the operation of p-n junctions and transistors, and the processing methods used to form modern integrated circuits. Electrical conduction in metal films, semiconductors, bipolar and field-effect transistors and light-emitting diodes. Diffusion, ion implantation, oxidation, metallization, and other process steps in fabricating semiconductor devices. Interplay between structural and electrical properties and their application to the design of semiconductor devices and integrated circuits.

ENGRD 264 Computerized Instrumentation Design (also A & E 264)
Fall, spring. 3 credits. Prerequisites: Engr 100 or CS 100. Lec, lab. Fall: T. Cool, spring: J. Brock. This course covers the use of a small computer in an engineering or scientific research laboratory. Various experiments are performed using an IBM-AT style computer (8086) running MS-DOS. The experiments and devices to be investigated include: input and output ports, analog to digital converters (ADC), digital to analog converters (DAC), thermistors, optical sensors, digital temperature control, non-linear least squares curve fitting of experimental data, thermal diffusion,
and viscosity of fluids. A second goal of this course is to develop effective written communication skills in the context of science and engineering. A number of rhetorical principles will be presented that can produce clarity in communication without oversimplifying scientific issues. Students will prepare progress reports, technical reports, and formal articles based on the experiments.

**ENGRD 270 Basic Engineering Probability and Statistics (also OR & IE 270)**

Fall, spring. 3 credits. Prerequisite: first-year calculus.

This course should give students a working knowledge of basic probability and statistics and their application to engineering. Computer analysis of data and simulation are emphasized. Topics include random variables, probability distributions, expectation, estimation, testing, experimental design, quality control, and regression.

**APPLIED AND ENGINEERING PHYSICS**

**A&EP 110 The Laser and Its Applications in Science, Technology, and Medicine (also ENGR 110)**

Fall, spring. 3 credits. This is a course in the Introduction to Engineering series. For description see Engineering Common Courses.

**A&EP 264 Computer-Instrumentation Design (also ENGR 264)**

Fall, spring. 3 credits. Prerequisites: Engr 100 or COM S 100.

For description see Engineering Common Courses.

**A&EP 303 Introduction to Nuclear Science and Engineering I (also NS & E 303)**

Fall. 3 credits. Prerequisite: Physics 214 or Mathematics 294.

For description see NS & E 303.

**A&EP 320 Engineering Biophysics: The Physics of Life**

Spring. 3 credits. Prerequisites: freshman and sophomore chemistry, physics, math. Introduction to biophysics for engineers to students interested in bioengineering.

**A&EP 321 Mathematical Physics I**


**A&EP 322 Mathematical Physics II**


**A&EP 330 Modern Experimental Optics (see also PHYS 350)**

Fall. 4 credits. Enrollment limited. Prerequisites: Physics 214 or equivalent. Lec M 2:30-3:20; lab T W 1:25-4:25.

This course introduces the fundamental experimental techniques used in modern optics and opto-mechanical components to provide the students with hands-on experience in practical laboratory techniques currently employed in physics, chemistry, biology, and engineering. The students will also be introduced to digital imaging and image processing techniques.

**A&EP 333 Mechanics of Particles and Solid Bodies**

Fall, summer. 4 credits. Prerequisites: Physics 112 or 116 and coregistration in A&EP 321 or equivalent or permission of instructor. Newton's mechanics; constants of the motion; many-body systems; linear oscillations; variational calculus, Lagrangian and Hamiltonian formalism for generalized coordinates; non-inertial reference systems; central-force motion; motion of rigid bodies; small vibrations in multi-mass systems; nonlinear oscillations; basic introduction to relativistic mechanics. Emphasis on mathematical treatments, physical concepts, and applications. (On the level of Classical Dynamics, by Marion and Thornton.)

**A&EP 355 Intermediate Electromagnetism**

Fall, summer. 4 credits. Prerequisites: Physics 214 or 217 and coregistration in A&EP 321 or equivalent, or permission of instructor. Topics: vector calculus, electrostatics, analytic and numerical solutions to Laplace's equation in various geometries, electric and magnetic multipoles, electric and magnetic materials, energy in fields, quasistatic and magnetic circuit design. Emphasis is on developing proficiency with analytical and numerical solution techniques in order to solve real-world design problems.


A first course in the systematic theory of electronic circuits. Topics include the harmonic oscillator, the Dirac formalism, angular momentum, the hydrogen atom, and perturbation theory.


Fall, spring. 4 credits. Prerequisites: Physics 208 or 213 or permission of the instructor. No previous experience with electronics assumed; however, the course moves quickly through some introductory topics such as basic DC circuits. Fall term usually less crowded. 1 lec, 2 labs. Fall: E. Kirkland; spring: J. Alexander.

Analyze, design, build and experimentally test circuits used in scientific and engineering instrumentation (with discrete components and integrated circuits). Analog circuits: resistors, capacitors, operational amplifiers (linear amplifiers with feedback, oscillators, comparators), filters, diodes and transistors. Digital circuits: combinatorial (gates) and sequential (flip-flops, counters, shift registers) logic. Computer interfacing introduced and used to investigate digital to analog (DAC) and analog to digital conversion (ADC) and signal averaging.

**A&EP 361 Introductory Quantum Mechanics**

Spring. 4 credits. Prerequisites: A&EP 333 or Physics 318; coregistration in A&EP 322 or equivalent and in A&EP 356 or Physics 326.

A first course in the systematic theory of quantum mechanics. Topics include the harmonic oscillator, the Dirac formalism, angular momentum, the hydrogen atom, and perturbation theory.

**A&EP 363 Statistical Thermodynamics**

Fall, spring. 4 credits. Prerequisites: Physics 208 or 213 or permission of the instructor. No previous experience with electronics assumed; however, the course moves quickly through some introductory topics such as basic DC circuits. Fall term usually less crowded. 1 lec, 2 labs. Fall: E. Kirkland; spring: J. Alexander.

Analyze, design, build and experimentally test circuits used in scientific and engineering instrumentation (with discrete components and integrated circuits). Analog circuits: resistors, capacitors, operational amplifiers (linear amplifiers with feedback, oscillators, comparators), filters, diodes and transistors. Digital circuits: combinatorial (gates) and sequential (flip-flops, counters, shift registers) logic. Computer interfacing introduced and used to investigate digital to analog (DAC) and analog to digital conversion (ADC) and signal averaging.

**A&EP 423 Statistical Thermodynamics**

Fall. 4 credits. Prerequisite: Introductory three-semester physics sequence plus one year of junior-level mathematics. Quantum statistical basis for equilibrium thermodynamics, microcanonical, canonical and grand canonical ensembles, and partition functions. Classical and quantum ideal gases, paramagnetic and multiple-state systems. Maxwell-Boltzmann, Fermi-Dirac, and Bose-Einstein statistics and applications. Introduction to systems of interacting particles. At the level of *Thermal Physics*, by Kittel and Kroemer, and *Statistical Physics*, by Rosser.
A&EP 434 Continuum Physics  
Spring. 4 credits. Prerequisites: A&EP 355 and 356 or equivalent.  


A&EP 438 Computational Engineering Physics  
Spring. 3 credits. Prerequisites: COM S 100, A&EP 321, 333, 355, 361, or equivalent, or permission of instructor; registration in 361 permitted.  

Numerical simulation (derivatives, integrals, differential equations, matrices, boundary-value problems, relaxation, Monte Carlo methods, etc.) will be introduced and applied to engineering physics problems that cannot be solved analytically (three-body problem, electrostatic fields, quantum energy levels, etc.). Computer programming required (in C or optionally C++, FORTRAN, or Pascal). Some prior exposure to programming assumed but no previous experience with C assumed.

A&EP 440 Quantum and Nonlinear Optics  

An introduction to the fundamentals of the interaction of laser light with matter. Topics include the propagation of laser beams in bulk media and in guided-wave structures, the origins of optical nonlinearities, harmonic generation, self-focusing, optical bistability, trapping, multiphoton processes, spontaneous and two-level atoms, atom cooling and identification. Credit to be arranged.

A&EP 606 Introduction to Plasma Physics  
For description, see ELE E 581.  

A&EP 607 Advanced Plasma Physics  
For description, see ELE E 582.

A&EP 609 Low-Energy Nuclear Physics  
Fall. 4 credits. Prerequisite: an introductory course in modern physics, including quantum mechanics. Offered alternate years. Not offered 1995–96.  

The nuclear interaction. Properties of ground and excited states of nuclei; models of nuclear structure; alpha, beta, gamma radioactivity, low-energy nuclear reactions—resonant and nonresonant scattering, absorption, and fission. At the level of Introduction to Nuclear Physics, by Enge.

A&EP 612 Nuclear Reactor Theory  
Fall. 4 credits. Prerequisites: a year of advanced calculus and some nuclear physics.  

Physical theory of fission reactors. Fission and neutron interactions with material, 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 Lamarche.

A&EP 615 Molecular Biophysics of Cell Dynamics  
To be arranged. 3 credits. Prerequisite: Graduate or senior level in science or engineering.  

Physical mechanisms in cellular function: statistical thermodynamics of ion channel molecules, single channel recording, receptor signaling, molecular motility and mobility. Intermolecular forces, spontaneous self-assembly of mesoscopic structures, molecular mechanisms of secretion, supramolecular mechanisms in memory and development.

A&EP 633 Nuclear Engineering  
Fall. 4 credits. Prerequisite: introductory course in nuclear engineering.  

The fundamentals of nuclear reactor engineering, reactor safety, fluid flow and heat transfer, control, environmental effects, and radiation protection.

A&EP 634 Nuclear Engineering Design Seminar  
Spring. 4 credits. Prerequisite: A&EP 633.  

A group design study of a selected nuclear system. Emphasis is on safety, stings, and radiation protection in the design of nuclear systems.

A&EP 638 Intense Pulsed Electron and Ion Beams: Physics and Technology  
Spring. 2 credits. Prerequisites: A&EP 606 (ELE E 581) and 607 (ELE E 582) or equivalent, or permission of instructor.  

Offered with demand warrants. Topics include (1) theoretical aspects of intense electron and ion beams, such as equilibria and stability; (2) technology of intense beam production, such as pulsed-power generator principles, and electron and ion diode operation; and (3) applications of intense beams, such as to controlled fusion, microwave generation, and laser pumping. Extensive discussion of experimental results.

A&EP 651 Nuclear Measurements Laboratory  
Spring. 4 credits. Prerequisite: A&EP 609 or equivalent. Primarily for graduate students in nuclear fields. A less-intensive related course, NS&E 551, is intended for students in non-nuclear fields in which nuclear methods are used. Lectures on interaction of radiation with matter, radiation protection, and nuclear instruments and methods. About fifteen experiments are available in radiation detection, attenuation, and measurement; electronic instrumentation, including computerized systems; activation analysis; neutron radiography; neutron moderation and reactor physics; neutron diffraction; and low-energy nuclear physics with neutron beams. The TRIGA reactor and the Zero Power Reactor critical facility are used. Students select seven or eight experiments to meet their interests and needs. At the level of Radiation Detection and Measurement, by Knoll.

A&EP 661 Microcharacterization  
Fall. 3 credits. Prerequisites: Introductory three-semester physics sequence or an introductory course in modern physics.  

At the senior/first-year graduate level. The basic physical principles underlying the many modern microanalytical techniques available for characterizing materials from volumes less than a cubic micron. Discussion centers on the physics of the interaction process by which the characterization is performed, the methodology used in performing the characterization, the advantages and limitations of each technique, and the instrumentation involved in each characterization method.

A&EP 662 Micro/Nano-fabrication and Processing  
Spring. 3 credits.  

An introduction to the fundamentals of micro and nano-fabricating and patterning thin-film materials and surfaces, with emphasis on electronic materials, with emphasis on electronic and optical materials, micromechanics, and other applications. Vacuum and plasma thin-film deposition processes. Photon, electron, X-ray, and ion-beam lithography. Techniques for pattern replication by plasma and ion processes. Emphasis is on understanding the physics and materials science of pattern formation for various processes. At the level of Brodie and Murray.

A&EP 681-689 Special Topics in Applied Physics  
Topics, instructors, and credits to be announced each term. Typical topics include quantum superconductive devices, physics of submicron conductors, nonlinear fluid flow, and biophysical processes, molecular fluorescence.

A&EP 711 Principles of Diffraction (also MSAE 610)  
Spring. 4 credits. Offered alternate years. Introduction to diffraction phenomena as applied to solid-state problems. Scattering and absorption of neutrons, electrons, and X-ray beams, with particular emphasis on synchrotron radiation X-ray sources. Diffraction from two- and three-dimensional periodic lattices. Fourier representation of scattering centers, and the effect of thermal vibrations. Diffraction from almost periodic structures, surface layers, gases, and amorphous materials. Survey of dynamical diffraction from perfect and imperfect lattices. Several laboratory experiments will be conducted.
CHEMICAL ENGINEERING

CHEME 101 Nonresident Lectures  
Spring. 1 credit. F. Rodriguez. 
Guest lecture series given by lecturers invited from industry and from other departments in the university to assist students in their transition from college to industrial life.

CHEME 112 Introduction to Chemical Engineering (also ENGRD 112)  
Fall, spring. 3 credits. Limited to freshmen. T. M. Duncan, C. Cohen. For description see Engineering Common Courses.

CHEME 219 Mass and Energy Balances (also ENGRD 219)  
Fall. 3 credits. Corequisite: physical or organic chemistry or permission of instructor. C. Cohen. For description see Engineering Common Courses.

CHEME 313 Chemical Engineering Thermodynamics  

CHEME 322 Fluid Mechanics  
Fall. 3 credits. Prerequisites: CHEME 219 and engineering mathematics sequence. W. B. Street. Fundamentals of fluid mechanics. Macroscopic and microscopic balances. Applications to problems involving viscous flow.

CHEME 324 Heat and Mass Transfer  

Applications to problems involving conduction, convection, and diffusion.

CHEME 332 Analysis of Separation Processes  
Spring. 4 credits. Prerequisites: CHEME 313 and 323. W. B. Street. Analysis of separation processes involving phase equilibria and mass transfer, some use of the digital computer. Phase equilibria; binary and multicomponent distillation; liquid-liquid extraction; gas absorption, adsorption, membrane separations.

CHEME 390 Reaction Kinetics and Reactor Design  
Spring. 3 credits. Prerequisites: CHEME 313 and 323. R. P. Merrill. A study of chemical reaction kinetics and principles of reactor design for chemical processes.

CHEME 432 Chemical Engineering Laboratory  
Fall. 4 credits. Prerequisites: CHEME 323, 324, 332, and 390. Staff. Laboratory experiments in fluid dynamics, heat and mass transfer, kinetics, other operations. Collection and interpretation of data. Technical report writing.

CHEME 462 Chemical Process Design  
Spring. 4 credits. Prerequisite: CHEME 432. Staff. A consideration of process and economic alternatives in selected chemical processes; design and assessment.

CHEME 472 Process Control  
Fall. 3 credits. Prerequisites: CHEME 324 and 390. J. R. Engstrom. Analysis of the dynamics of chemical processes and design of feedback and feedforward control systems. Laplace transform techniques; stability analysis; frequency-response analysis. An introduction to multivariable control. The laboratory includes experiments on transient response, frequency response, controller tuning, and discussions of typical process instrumentation.

CHEME 481 Biomedical Engineering  
Fall. 3 credits. Prerequisite: CHEME 324 or equivalent or permission of instructor. D. A. Hammer. Special topics in biomedical engineering, including cell separations, blood flow, design of artificial devices, biomaterials, image analysis, biological transport phenomena, pharmacokinetics and drug delivery, biomedical transducers (ECG and pace makers), and analysis of physiological processes such as adhesion, mobility, secretion, and growth.

CHEME 490 Undergraduate Projects in Chemical Engineering  
Fall, spring. Variable credit. Research or studies on special problems in chemical engineering.

CHEME 491 Undergraduate Teaching in Chemical Engineering  
Fall, spring. 1 credit. Methods of instruction in chemical engineering acquired through discussions with faculty and by assisting with the instruction of freshmen and sophomores.

CHEME 520 Chemical, Pharmaceutical, and Food Processing  
Spring. Variable to 3 credits. Prerequisite: seniors or M.Eng. students with one term of college chemistry, C. Cohen, R. Finn, and S. Mulvany. This course consists of three equal parts, each worth one credit. The chemical part is open to non-chemical engineers only and covers process fundamentals, design, and control of continuous large-scale chemical processes. Pharmaceutical processing covers fermentation, purification, and stabilization. Food processing emphasizes food preservation principles and technology.

CHEME 562 Managing Chemical Process Design  
Spring. 1 or 2 credits. Prerequisite: CHEME 462. Staff. Guidance and evaluation of chemical process designs developed by teams of chemical engineers.

CHEME 564 Design of Chemical Reactors  

CHEME 565 Design Project  
Fall, spring. 3 or 6 credits. Required for students in the M.Eng. (Chemical) program. Design study and economic evaluation of a chemical processing facility, alternative methods of manufacture, raw-material preparation, food processing, waste disposal, or some other aspect of chemical processing.

CHEME 566 Systematic Methods for Process Design  

CHEME 590 Special Projects in Chemical Engineering  
Fall, spring. Variable credit. Limited to graduate students. Non-thesis research or studies on special problems in chemical engineering.

CHEME 640 Polymeric Materials  
Fall. 3 credits. F. Rodriguez. Chemistry and physics of the formation and characterization of polymers. Principles of fabrication.

CHEME 642 Polymeric Materials Laboratory  
Spring. 2 or 3 credits. Prerequisite: CHEME 640. F. Rodriguez. Experiments in the formation, characterization, fabrication, and testing of polymers.

CHEME 643 Introduction to Bioprocess Engineering  
Spring. 3 credits. Prerequisite: CHEME 390 or permission of instructor. No prior background in the biological sciences required. M. L. Shuler.
A discussion of principles involved in using microorganisms, tissue cultures, and enzymes for processing. Application to food, fermentation, and pharmaceutical industries and to biological waste treatment.

**CHME 645 Advanced Concepts in Biological Engineering**

Spring. 3 credits. Prerequisite: CHME 643 or equivalent or permission of instructor. Not offered fall 1996; next offered spring 1997. D. A. Hammer. Fundamentals of biochemical and biomedical engineering, with additional emphasis on cell and membrane biophysics. Topics include cell surface receptors, phenomena, protein diffusion, cell adhesion, membrane biophysics, cell motility and growth, mathematical immunology, virus binding and infection, enzyme catalysis, bioseparation, and genetically modified organisms.

**CHME 648 Polymers in Electronics and Related Areas**

Spring. 3 credits. Prerequisite: CHME 324 or equivalent or permission of instructor. Not offered fall 1996; next offered spring 1997. P. Harriss. Diffusion of small molecules in gases, liquids, and solids. Membrane separation processes including gas separation, pervaporation, reverse osmosis, and ultrafiltration. Purification of gases and liquids by adsorption, ion exchange, and chromatography.

**CHME 656 Separations Using Membranes or Porous Solids**


**CHME 673 Adsorption and Reactions on Chemically Reactive Solids**

Fall. 3 credits. P. Harriss. The physics and chemistry of reactions at solid surfaces are presented in molecular detail. The emphasis is on the use of modern spectroscopic techniques to determine the geometric structure, electronic properties, and reaction sequences on well-defined surfaces. Examples from the preparation of optoelectronic materials and from catalysis will be given to illustrate the concepts and principles presented.

**CHME 675 Synthetic Polymer Chemistry (also M&AE 671 and Chemistry 671)**

Fall. 4 credits. Prerequisites: Chem 359–360 or equivalent or permission of instructor. M&AE 620 is recommended. For description see Chemistry 671.

**CHME 681 Dynamics of Colloidal Systems**

Fall. 3 credits. Prerequisite: basic understanding of thermodynamics and fluid dynamics. Offered alternate years. Not offered fall 1995 and fall 1997; next offered fall 1996. A. Z. Panagiotopoulos.

Fundamental descriptions of colloidal systems under equilibrium and non-equilibrium conditions. Phase equilibria of surfactant systems, thermodynamics of micelle formation, forces between colloidal particles, electrokinetic phenomena, flocculation and aggregation, transport of surfactant in interfacial systems, stability of emulsions, and dynamics of thin films. Open to advanced undergraduates and graduate students from all fields.

**CHME 711 Advanced Chemical Engineering Thermodynamics**

Fall. 3 credits. Prerequisite: CHME 313 or equivalent. R. E. Gruver. Postulatory approach to thermodynamics. Legendre transformations. Equilibrium and stability of general thermodynamic systems. Applications of thermodynamic methods to advanced problems in chemical engineering. Introduction to statistical mechanical ensembles, phase transitions, Monte Carlo methods, and theory of liquids.

**CHME 713 Chemical Kinetics and Dynamics**


**CHME 721 Thermodynamics and Phase Change Heat Transfer (also M&AE 652)**

Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. For description see M&AE 652.

**CHME 731 Advanced Fluid Mechanics and Heat Transfer**

Fall. 3 credits. Prerequisites: CHME 323 and 324 or equivalent. D. L. Koch. Derivation of the equations of motion for Newtonian fluids. Low Reynolds number fluid dynamics, lubrication theory, inviscid fluid dynamics. Boundary layer theory. Convective and conductive heat transfer.

**CHME 732 Diffusion and Mass Transfer**

Spring. 2 credits. Prerequisite: CHME 731 or equivalent. D. L. Koch. Conservation equations in multicomponent systems, irreversible thermodynamics, dispersion, and Brownian diffusion. Mass transfer for convective diffusion in liquids. Application to a variety of problems such as coagulation of aerosols, diffusion through films and membranes, liquid-liquid extraction, chemical vapor injection, polymer rheology and diffusion, and reaction-diffusion systems.

**CHME 741 Selected Topics in Biomedical Engineering**

Fall. 1 credit (may be repeated for credit). Prerequisite: CHME 643 or permission of instructor. M. L. Shuler. Discussion of current topics and research in biomedical engineering for graduate students.

**CHME 745 Physical Polymer Science**


**CHME 751 Mathematical Methods of Chemical Engineering Analysis**


**CHME 753 Analysis of Nonlinear Systems: Stability, Bifurcation, and Continuation**


**CHME 772 Theory of Molecular Liquids**

Spring. 3 credits. Prerequisite: CHME 711 or equivalent. Not offered 1996 or 1998; next offered 1997. Theory of intermolecular forces, and equilibrium statistical mechanics for nonshperical 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.

**CHME 774 Atomistic Simulation of Materials**

Spring. 3 credits. Prerequisite: Competence in FORTRAN, PASCAL, or C. Prior knowledge of statistical mechanics helpful. Offered alternate years. A. Z. Panagiotopoulos. The statistical mechanical theory behind Monte-Carlo and Molecular-Dynamics computer-simulation techniques. Strong emphasis is placed on students writing their own MC and MD code. Calculation of distribution functions, thermodynamic, kinetic and structural properties. Introduction to the application of computer graphics to simulation. Interparticle forces and application of atomistic simulation of systems containing metals, semiconductors, and biological materials. Issues of code efficiency and vectorization.

**CHME 790 Seminar**

Fall, spring. 1 credit each term. General chemical engineering seminar required of all graduate students in the Field of Chemical Engineering.
CIVIL AND ENVIRONMENTAL ENGINEERING

General

CEE 113 Environmental Systems Engineering (also ENGR 113) Fall. 3 credits. Staff. For description see Engineering Common Courses.

CEE 116 Modern Structures (also ENGR 116) Fall. 3 credits. A. R. Ingraffea. For description see Engineering Common Courses.

CEE 120 Readings on the Environment Spring. 1 credit. A reading course from an introductory environmental text. Topics include structure and dynamics of ecosystems, water habitats and communities, water resources, toxic-waste pollution of surface and groundwater, international water-pollution problems, energy resources, nuclear-waste disposal, hydroelectric power, environmental carcinogens. Not available to students receiving credit for ENGR 113 or Natural Resources 201.


CEE 204 Uncertainty Analysis in Engineering Fall. 4 credits. Prerequisite: first-year calculus. M. Grigorii. An introduction to probability theory and statistical techniques, with examples from civil, environmental, agricultural, and related disciplines. The course covers data presentation, probability theory, commonly used probability distributions, parameter estimation, probability plotting and normality tests, confidence intervals, hypothesis testing, simple linear regression, and nonparametric statistics. Examples include structural reliability, models of vehicle arrivals, and distributions describing wind speeds, floods, pollutant concentrations, and soil and material properties. Total quality management employed.

CEE 309 Special Topics in Civil and Environmental Engineering Fall, spring. 1-6 credits. Staff. Supervised study by individuals or groups of upper-division students on an undergraduate research project or on specialized topics not covered in regular courses.

CEE 400 Senior Honors Thesis Fall, spring. Variable credits. Staff. Available to students admitted to the CEE Honors Program. Supervised research or project work resulting in an honors thesis.

CEE 501 Civil and Environmental Engineering Design Project I Fall. 3 credits. Required for students in the M.Eng.(Civil) program. Staff. Design of minor civil engineering project. Planning and preliminary design in fall term; final design in January intersession (CEE 502).

CEE 502 Civil and Environmental Engineering Design Project II Spring (work required during January intersession). 3 credits. Required for students in the M.Eng.(Civil) program. Staff. A continuation of CEE 501.

CEE 503 Professional Practice in Engineering Spring. 3 credits. Required for and limited to students in the M.Eng.(Civil) program. Staff. Financial, legal, regulatory, ethical, and business aspects of engineering practice are examined in detail. Students are expected to develop their understanding of the interrelations among the physical, social, economic, and ethical constraints on engineering design.

CEE 601 Water Resources and Environmental Engineering Seminar Fall. 1 credit. Presentation of topics of current interest.

Remote Sensing

[CEE 411 Remote Sensing: Environmental Applications (also SCAS 461)] Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1995-96. Offered 1996-97 and 1997-98. Staff. A survey of how remote sensing is applied in various environmental disciplines. Laboratory emphasis is on using aircraft and satellite imagery for inventorying and monitoring surface features in engineering, planning, agriculture, and natural resource assessments.

CEE 610 Remote Sensing Fundamentals (also Agronomy 660) Fall. 3 credits. Prerequisite: permission of instructor. W. D. Philpot. An introduction to equipment and methods used in obtaining information about earth resources and the environment from aircraft or satellite. Coverage includes sensors, sensor and ground-data acquisition, data analysis and interpretation, and project design.

CEE 615 Digital Image Processing Spring. 3 credits. Prerequisites: familiarity with algebra and trigonometry (e.g., Math 109) and statistics (e.g., CEE 504 or Agricultural Economics 310), or permission of instructor. W. D. Philpot. An introduction to digital image-processing concepts and techniques, with emphasis on remote-sensing applications. Topics include image acquisition, enhancement procedures, spatial and spectral feature extraction, and classification. Assignments will require the use of image-processing software and graphics.

CEE 617 Project—Remote Sensing Fall. 3 credits. W. D. Philpot. Students may elect to undertake a project in remote sensing. The work is supervised by a professor in this subject area.

CEE 618 Special Topics—Remote Sensing On demand. 1-6 credits. W. D. Philpot. Supervised study in small groups on one or more special topics not covered in the regular courses. Special topics may be of a theoretical or applied nature.

CEE 619 Seminar in Remote Sensing (also SCAS 662) Spring. 1 credit. S-U grades only. Lectures on current developments in assessing earth resources or the environment. Each week a different topic on remote sensing or geographic information systems is presented by specialists from government, industry, Cornell, or other research or academic institutions.

CEE 710 Research—Remote Sensing On demand. 1-6 credits. W. D. Philpot. For students who want to study one particular area in depth. The work may take the form of laboratory investigation, field study, theoretical analysis, or development of design procedures.

CEE 810 Thesis—Remote Sensing Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. W. D. Philpot. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Environmental and Public Systems

See also CEE 120.

CEE 323 Engineering Economics and Management (also ENGRG 323) Spring, usually offered in summer for Engineering Co-op Program. 3 credits. Primarily for juniors and seniors. R. E. Schuler. For description see Engineering Common Courses.

CEE 422 The Economics of Infrastructure and a Sustainable Environment (also ECON 422) Fall. 4 credits. Prerequisite: Mathematical version of intermediate micro-economics (CEE 321 or ECON 205 or 315). B. E. Schuler. Analysis of the broad economic, technological, and ecological environments in which products, projects and engineered systems are implemented. Infrastructure includes public physical capital (roads, utilities, water, and sewer), human capital (education and R&D), and biological capital (biodiversity, resources, and the natural environment). Market failures that must be resolved include the environment, public goods, renewable resources, scale economies, urbanization, demographics and technological innovation. Planning tools presented include methods for assessing project demand, cost-benefit analysis, choosing proper discount rate, dealing with uncertainty, financial constraints, and when and how to price. Also discussed are problems of sustainability, the allocation of scarce and previously nonmarketed resources, and the planning and management of activities with uncertain environmental consequences.
CEE 432 Environmental Quality Systems Analysis
Spring. 3 credits. Prerequisites: Math 294 and systems (CEE 323). Intended for undergraduates who have not taken OR&E 520 or ABEN 475. Most lectures concurrent with CEE 623. C. A. Shoemaker.
Applications of optimization and simulation methods to the development of plans and the design and operation of facilities for managing environmental problems for nonlinear programming, linear programming, and sensitivity analysis. See description of CEE 623 for water quality applications.

CEE 529 Water and Environmental Resources Problems and Policies
Fall. 3 credits. Intended primarily for graduate engineering and non-engineering students but open to qualified upperclass students. Prerequisite: permission of instructor. D. J. Allee and L. B. Dworsky. Evaluation, appraisal, and prospects for problems involving water and environmental resource management. Organization and public policies in the federal system.

[CEE 620 Water-Resources Systems I]
Development and application of deterministic and stochastic optimization and simulation models for water-resources planning and management. River-basin modeling, including reservoir design and operation, irrigation planning and operation, hydropower-capacity development, flow augmentation, flood control and protection, and water-quality prediction and control.

CEE 621 Water-Resources Systems II: Stochastic Hydrology
Spring. 3 credits. Prerequisites: CEE 304 and 620 or permission of instructor. Offered 1995–96 and 1997–98. Not offered 1996–97. J. R. Stedinger. Course examines statistical, time series, and stochastic optimization methods used to address water resources problems. Statistical problems include properties of moments and other statistical estimators, maximum likelihood, method of moments, and method of L-moments estimation; censored datasets and historical information; probability plotting; Bayesian inference and index flood methods; ARMA and Box-Jenkins models; and disaggregation and multivariate stochastic streamflow models. Course also addresses Monte Carlo methods, stochastic simulation of water resource systems, and stochastic reservoir-operation optimization models.

CEE 623 Environmental Quality Systems Analysis
Spring. 3 credits. Prerequisites: Math 294 and optimization (ABEN 475, CEE 593, or OR&IE 320/520 or permission of instructor). C. A. Shoemaker.
Applications of optimization, simulation methods, and uncertainty analysis to the design and operation of facilities for managing the quality of surface- and groundwater. Applications include location of wastewater, solid waste, and hazardous-waste facilities; restoration of dissolved oxygen levels in rivers, and reclamation of contaminated aquifers. Optimization applications use linear programming, and integer, dynamic, and nonlinear programming.

CEE 626 Environmental and Water Resources Systems Analysis Seminar
Spring. 1 credit. Prerequisite: permission of instructor. Staff. Graduate students and faculty members give informal lectures on various topics related to ongoing research in environmental or water resources systems planning and analysis.

CEE 722 Environmental and Water Resources Systems Analysis Research
On demand. Variable credit. Prerequisite: permission of instructor. Preparation must be suitable to the investigation to be undertaken. Staff. Investigations of particular environmental or water resources systems problems.

CEE 729 Special Topics in Environmental or Water Resources Systems Analysis
On demand. Variable credit. Staff. Supervised study, by individuals or small groups, of one or more specialized topics not covered in regular courses.

CEE 820 Thesis—Environmental and Water Resource Systems
Fall, spring. 1–12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Fluid Mechanics and Hydrology

CEE 331 Fluid Mechanics
Fall; usually offered in summer for Engineering Co-op Program. 4 credits. Prerequisite: Engr 202 (may be taken concurrently). W. H. Brutsaert. Hydrostatics, the basic equations of fluid flow, potential flow and dynamic pressure forces, viscous flow and shear forces, steady pipe flow, turbulence, dimensional analysis, open-channel flow. Elements of design in water supply systems, canals, and other hydraulic schemes.

CEE 332 Hydraulic Engineering
Spring. 4 credits. Prerequisite: CEE 331. P. L.-F. Liu. Application of fluid-mechanical principles to problems of engineering practice and design: hydraulic machinery, water-distribution systems, open-channel design, river engineering, groundwater flow, and pollutant dispersal. Lectures supplemented by laboratory work and a design project.

CEE 431 Geohydrology (also ABEN 471 also GEOL 445)

CEE 432 Hydrology
Spring. 3 credits. Prerequisite: CEE 331. W. H. Brutsaert. Application of fluid-mechanical principles to problems of engineering practice and design: hydraulic machinery, water-distribution systems, open-channel design, river engineering, groundwater flow, and pollutant dispersal. Lectures supplemented by laboratory work and a design project.

CEE 433 Pollutant Transport and Transformation in the Environment
Fall. 3 credits. Prerequisite: CEE 331. Intended for undergraduates. Lectures concurrent with CEE 655. J. J. Biscogni. Introduction to the physical transport and chemical and biochemical processes that govern the fate and distribution of pollutants in the environment. See description for CEE 655.

CEE 435 Coastal Engineering
Spring. 4 credits. Prerequisite: CEE 331. P. L.-F. Liu. Introduction to water wave phenomena, including wave generation, shoaling, refraction, diffraction, and breaking. Applications of wave theories to engineering design problems such as forces on coastal structures and beach erosion in coastal zones. Lectures supplemented by four laboratory assignments and a design project.

CEE 630 Advanced Fluid Mechanics
Introduction to tensor analysis; conservation of mass, momentum, and energy. Rigorous treatment includes derivation of exact solutions of the Navier-Stokes equations. Asymptotic approximations at low and high Reynolds numbers. Similarity and modeling. Laminar diffusion of momentum, mass, and heat.

CEE 631 Flow and Contaminant Transport Modeling in Groundwater

CEE 632 Hydrology
For description, see CEE 432. W. H. Brutsaert.

CEE 633 Flow in Porous Media and Groundwater

CEE 634 Boundary Layer Meteorology
Fall. 3 credits. Prerequisite: CEE 331 or permission of instructor. Not offered 1995–96 and 1997–98; offered 1996–97. Physical processes in the lower atmospheric environment: turbulent transport in the atmospheric boundary layer, surface-air interaction, disturbance by land and sea breezes, and radiation. Applications include sensible and latent heat transfer from lakes, plant canopy flow and evapotranspiration, turbulent
Geotechnical Engineering

**CEE 341 Introduction to Geotechnical Engineering**

**CEE 640 Foundation Engineering**

**CEE 641 Retaining Structures and Slopes**

**CEE 643 Pavement Engineering (also ABEN 692)**
Spring. 4 credits. Limited to engineering seniors and graduate students. Prerequisite: CEE 341 and 462. L. H. Irwin. For description see ABEN 692.

**CEE 649 Seminar in Geotechnical Engineering**
Fall, spring. 1 credit. Staff. Presentation and discussion of topics in current research and practice in geotechnical engineering.

**CEE 650 Special Topics in Geotechnical Engineering**
On demand. 1-6 credits. Staff. Supervised study of special topics not covered in the formal courses.

**CEE 740 Engineering Behavior of Soils**
Fall. 4 credits. Prerequisite: CEE 341. H. A. Stewart. Detailed study of the physicochemical nature of soil. Stress states due to geostatic loading and stress-history effects. In-depth evaluation of soil-structure interaction. Basic theory and design for water flow in soil, one-dimensional consolidation of clay and silts, and shear-strength problems. Slope stability, earth pressure, geotechnics, and landfill and waste-containment issues. Laboratory experiments and demonstrations using resonant column and other tests. Synthesis of soil analysis and laboratory-test results for the design of engineering structures.

**CEE 741 Rock Engineering**
Fall. 3 credits. Prerequisite: CEE 341 or permission of instructor. Recommended: introductory geology. T. D. O'Rourke. Geological and engineering classifications of intact rock, discontinuities, and rock masses. Laboratory and field evaluation of properties. Stress states and stress analysis. Design of foundations on, and openings in, rock masses. Analysis of the stability of rock slopes.

**CEE 744 Advanced Foundation Engineering**
Spring. 2 credits. Prerequisite: CEE 460. F. H. Kulhawy. A continuation of CEE 640, with detailed emphasis on special topics in soil-structure interaction. Typical topics include lateral and pullout loading of deep foundations, pile group behavior, foundations for offshore structures, foundations for special structures.

**CEE 745 Soil Dynamics**
Spring. 4 credits. Prerequisite: permission of instructor. H. A. Stewart. Study of soil behavior under dynamic loading conditions. Foundation design for vibratory loadings. Introductory earthquake engineering including soil and laboratory techniques for determining dynamic soil properties and liquefaction potential. Design of embankments and retaining structures under dynamic loading conditions. Laboratory experiments and demonstrations using resonant column and a range of cyclic testing equipment.

**CEE 746 Embankment Dam Engineering**
Spring. 2 credits. Prerequisites: CEE 641 and 741, or permission of instructor. 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 talus dam design.

**CEE 749 Research in Geotechnical Engineering**
On demand. 1-6 credits. Staff. For the student who wants to pursue a particular geotechnical topic in considerable depth.

**CEE 840 Thesis—Geotechnical Engineering**
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Environmental Engineering

**CEE 351 Environmental Quality Engineering**

**CEE 352 Water Supply Engineering**
CEE 453 Laboratory Research in Environmental Engineering
Fall. 2 credits. Prerequisites: CEE 351, CEE 352. Enrollment limited to 12. J. J. Bisogni Jr. and R. K. Weber-Shirk.
Laboratory investigations reflecting faculty research on current environmental problems. Laboratory exercises will change from year to year. Possible topics include: Acid rain/lake chemistry; contaminated soil-site assessment, risk assessment, and remediation; packed tower air stripping treatment of contaminated groundwater; pollutant dispersion/transport in rivers; drinking water filtration for pathogen removal; oxygen sag in rivers, and biodegradation in landfills.

CEE 651 Microbiology for Environmental Engineering
Fall. 2 credits. Prerequisite: one semester of college chemistry. J. M. Gossett.
A self-paced autotutorial introduction to fundamental aspects of microbiology, organic chemistry, and biochemistry pertinent to environmental engineering. Course work consists of assigned readings, study questions, and brief exams.

CEE 653 Water Chemistry for Environmental Engineering
Fall. 3 credits. Prerequisite: one semester of college chemistry or permission of instructor. L. W. Lion.
Principles of chemistry applicable to the understanding, design, and control of water and wastewater treatment processes and to reactions in receiving waters. Topics include chemical thermodynamics, reaction kinetics, acid-base equilibria, mineral precipitation/dissolution, and electrochemistry. The focus of the course is on the mathematical description of chemical reactions relevant to engineered processes and natural systems and the numerical or graphical solution of these problems.

CEE 654 Aquatic Chemistry
Spring. 3 credits. Prerequisite: CEE 653 or Chemistry 287-288. J. J. Bisogni.
Concepts of chemical equilibria applied to natural aquatic systems. Topics include acid-base reactions, buffer systems, mineral precipitation, coordination and redox reactions, Eh-pH diagrams, adsorption phenomena, humic acid chemistry, and chemical-equilibrium computational techniques. In-depth coverage of topics covered in CEE 653.

CEE 655 Pollutant Transport and Transformation in the Environment
For description, see CEE 433. J. J. Bisogni.

CEE 658 Sludge Treatment, Utilization, and Disposal
Spring. 3 credits. Prerequisite: CEE 352 or permission of instructor. R. J. Dick.
Analysis of the quantity and quality of residues produced from municipal and industrial water-supply and pollution-control facilities and other residue-producing processes as functions of process design and operational alternatives for reclaiming or disposing of hazardous and nonhazardous residues with assessment of potential environmental impacts. Fundamemtal factors influencing performance of treatment processes for removing water from sludges and for altering sludge properties prior to reuse or ultimate disposal. Considerations in selecting and integrating of sludge-management processes to approach optimal design.

CEE 659 Environmental Quality Engineering Seminar
Spring. 1 credit. Prerequisite: enrollment as graduate student in environmental engineering. Staff.
Presentation and discussion of current research and design projects in environmental engineering.

CEE 750 Research in Environmental Engineering
On demand. 1-6 credits. Staff.
For students who wish to study a particular area in depth. The work may take the form of laboratory investigation, field study, theoretical analysis, or development of design and analysis procedures.

CEE 755 Environmental Engineering Processes I
Fall. 3 credits. Prerequisite: Previous or concurrent enrollment in CEE 653 or permission of instructor. J. M. Gossett.
Theoretical and engineering aspects of chemical and physical phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in receiving waters. Analysis and design of treatment processes and systems.

CEE 756 Environmental Engineering Processes II
Spring. 3 credits. Prerequisites: CEE 651 and 755, or permission of instructor. J. M. Gossett.
Theoretical and engineering aspects of biological phenomena and processes applicable to the removal of impurities from water, wastewater, and industrial wastes and to their transformation in receiving waters. Biokinetic analysis and design of biological treatment process.

CEE 757 Environmental Engineering Processes Laboratory I
Fall. 2 credits. Prerequisite: concurrent enrollment in CEE 653 and 755. J. J. Bisogni.
Laboratory studies of aquatic chemistry and physical/chemical processes of environmental engineering. Topics include gravimetric analyses; acids/bases; alkalinity; gas chromatography; UV-visible and atomic absorption spectrophotometry; adsorption; filtration; ion exchange; gas transfer; sedimentation; characterization of reactor mixing regimes; coagulation.

CEE 758 Environmental Engineering Processes Laboratory II
Spring. 2 credits. Prerequisite: CEE 651 and concurrent enrollment in CEE 756. J. M. Gossett.
Laboratory studies of microbiological phenomena and environmental engineering processes. Topics include microscopy, biochemical and chemical oxygen demand; biological treatability studies; enumeration of bacteria.

CEE 759 Special Topics in Environmental Engineering
On demand. Variable credit. Staff.
Advanced subject matter not covered in depth in other regular courses.

CEE 760 Thesis—Transportation Engineering
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Transportation
CEE 361 Introduction to Transportation Engineering
Spring; usually offered in summer for Engineering Co-op Program. 3 credits. A. H. Meyburg.
Introduction to technological, economic, and social aspects of transportation. Emphasis on design and functioning of transportation systems and their components. Supply-demand interactions; system planning, design, and management; traffic flow and control interaction and network analysis. Institutional and energy issues; environmental impact.

CEE 362 Highway Engineering (also ABEN 491)
Fall. 3 credits. Prerequisites: Fluid mechanics (may be taken concurrently) and junior standing in engineering. L. H. Irwin.
For description, see ABEN 491.

CEE 463 Transportation and Information Technology
Fall. 3 credits. Prerequisite: CEE 361 or permission of the instructor. L. K. Nozick.
Focuses on shift from building new infrastructure to improving the utilization of current facilities. Reviews major legislation that solidifies this shift and examines the role of computer and telecommunications technology. Technologies to be considered include tags and readers, weight-in-motion, cellular communication technology, the global positioning system, on-board navigation systems, databases, and distributed databases.

CEE 664 Transportation Systems Design
Spring. 3 credits. Prerequisite: CEE 361. Staff.
Advanced techniques for physical and operational design of transportation systems, including analytical modeling techniques underlying design criteria. Evaluation of alternative designs. Management and operating policies, including investment strategies. Facility location decisions, networks, and passenger and freight terminals.

CEE 762 Transportation Research
On demand. Variable credit. Staff.
In-depth investigation of a particular transportation planning or engineering problem mutually agreed upon between the student and one or more faculty members.

CEE 764 Special Topics in Transportation
On demand. Variable credit. Staff.
Advanced subject matter not covered in depth in other regular courses.

CEE 860 Thesis—Transportation Engineering
Fall. spring. 1-12 credits. Students must register for credit with the professor at the start of each term. A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Structural Engineering
See also CEE 116.
CPE 783 Civil and Environmental Engineering Materials Project
On demand. 1-3 credits. K. C. Hover.
Individual projects or reading and study assignments involving engineering materials.

CPE 785 Research in Structural Engineering
On demand. Variable credit. Staff.
Pursuit of a branch of structural engineering beyond what is covered in regular courses.
Theoretical or experimental investigation of suitable problems.

CPE 786 Special Topics in Structural Engineering
On demand. Variable credit. Staff.
Individually supervised study or independent research in specialized topics not covered in regular courses. Occasional offering of such special courses as Shell Theory and Design, and Advanced Topics in Finite Element Analysis.

CPE 880 Thesis—Structural Engineering
Fall, spring. 1-12 credits. Students must register for credit with the professor at the start of each term. Staff.
A thesis research topic is selected by the student with the advice of the faculty member in charge and is pursued either independently or in conjunction with others working on the same topic.

Engineering Management

CPE 590 Engineering Management Practice
Fall. 3 credits. Prerequisite: permission of instructor. M. A. Turnquist.
An introduction to the work and skills of management, especially for the management of projects. Planning, organizing, communicating, scheduling, controlling, and correcting will be covered in combination of lectures, readings, outside assignments, and in-class role-playing exercises.

CPE 591 Engineering Management Project
Fall. 3 credits. Prerequisite: permission of instructor. M. A. Turnquist and L. K. Nozik.
An intensive evaluation of the management aspects of a major engineering project or system. Most students will work on a large group project in the area of project management, but students may also work singly or in small groups on an engineering management topic of special interest to them.

CPE 592 Engineering Management Project
Spring. 3 credits. Prerequisite: permission of instructor. M. A. Turnquist and L. K. Nozik.
A continuation of CPE 591.

CPE 593 Engineering Management Methods I: Data, Information, and Modeling
Fall. 3 credits. Prerequisites: OR&IE 320 and OR&IE 270 or CPE 304 or equivalent. L. K. Nozik.
Methods for managing data and transforming data into information through modeling as a means to synthesize information into knowledge that can form the basis for decisions and actions. Application of statistical methods and optimization to managerial problems in project scheduling, quality control, forecasting, and resource allocation.

CPE 594 Engineering Management Methods II: Managing Uncertain Systems
Spring. 3 credits. Prerequisite: CPE 593 or permission of instructor. M. A. Turnquist.
Modeling and managing systems in which uncertainty is a major determinant of system behavior. Systems which are subject to breakdown, deterioration and queuing. Simulation as a tool for analyzing uncertain systems. Projects and case studies to illustrate application of the methods.

CPE 595 Construction Planning and Operations
Fall. 3 credits. Prerequisite: permission of instructor. K. C. Hover.
A course on the fundamentals of construction planning: organization of the workforce, construction planning, scheduling, and cost estimating, bidding, design of falsework and shoring systems, construction loadings, materials handling for construction, optimization of construction processes, applications of computer methods.

CPE 597 Risk Analysis and Management
Spring. 3 credits. Prerequisite: CPE 304 or OR&IE 270 or equivalent. J. R. Steenderen.
Course develops a working knowledge of risk terminology, analytic tools used to analyze environmental and technological risks, and social and psychological risk issues. Discussions address life risks in the U.S., transportation risks, transportation of hazardous materials, waste incineration and remediation, public health risks such as AIDS, regulatory policy, risk communication, environmental risk issues in the media, and risk management.

CPE 692 Special Topics in Engineering Management
On demand. 1-6 credits. Staff.
Individually supervised study of one or more specialized topics not covered in regular courses.

CPE 694 Research in Engineering Management
On demand. 1-6 credits. Staff.
The student may select an area of investigation in engineering management. Results should be submitted to the instructor in charge in the form of a research report.

COMPUTER SCIENCE

The Department of Computer Science is part of both the College of Arts and Sciences and the College of Engineering.

COM S 099 Fundamental Programming Concepts
Fall. 2 credits. No prerequisites. S-U grades only.
This course is designed for students who intend to take COM S 100 but are not adequately prepared for that course. Students who do not intend to take COM S 100 but want some introduction to computers and programming should take COM S 101 instead. Students cannot receive credit for both COM S 101 and COM S 099. Basic programming concepts and problem analysis are studied. The programming language used is Pascal. Students with previous programming experience should not take this course.

COM S 100 Introduction to Computer Programming
Fall, spring, summer. 4 credits. Students who plan to take COM S 101 and also 100 must take 101 first.
An introduction to elementary computer programming concepts. Emphasis is on techniques of problem analysis and the development of algorithms and programs. The subject of the course is programming, not a particular programming language. The principal programming language is C. The course does not presume previous programming experience. Programming assignments are tested and run on interactive, stand-alone microcomputers. During most semesters, two versions of COM S 100 are available as described below.

COM S 100a Introduction to Computer Programming
Standard version of COM S 100. No college-level mathematics is assumed. Register for COM S 100.

COM S 100b Introduction to Computer Programming
Prerequisite: MATH 111, 191 or equivalent. Offered fall only.
Alternative version of COM S 100, emphasizing examples and applications involving continuous mathematics, including trigonometry and calculus. Register for COM S 100. COM S 100b is not always available at all COM S 100 lecture hours.

COM S 101 The Computer Age (also ENGRG 101)
Summer. 3 credits. Credit is granted for both COM S 100 and 101 only if 101 is taken first.
An introduction to computer science and programming for students in nontechnical areas. The aims of the course are to acquaint the student with the major ideas in computer science and to develop an appreciation of algorithmic thinking. Topics may include the history of computation, microtechnology, the retrieval and transmission of information; scientific computing, computer graphics, art, and music; robotics, natural-language processing, and machine intelligence.

COM S 211 Computers and Programming (also ENGRD 211)
Fall, spring, summer. 3 credits. Credit will not be granted for both COM S 211 and 212. Prerequisite: COM S 100 or equivalent programming experience.
Intermediate programming in a high-level language and introduction to computer science. Topics include program development, proofs of program correctness, program structure, recursion, abstract data types, object-oriented programming, data structures, and analysis of algorithms. Pascal is the principal programming language.

COM S 212 Structure and Interpretation of Computer Programs (also ENGRD 212)
Fall, spring. 4 credits. Credit will not be granted for both COM S 211 and 212. Prerequisite: CPE 592 or equivalent programming experience.
A challenging introduction to programming languages and computer science that emphasizes alternative modes of algorithmic
expression. Topics include recursive and higher-order procedures, performance analysis of algorithms, proofs of program correctness, probabilistic algorithms, symbolic hierarchial data, abstract data types, polymorphic functions, object-oriented programming, infinite data types, simulation, and the interpretation of programs. Programs are written in Scheme, a dialect of LISP.

COM S 312 emphasizes a varied collection of advanced programming concepts and techniques available in a modern functional programming language. In contrast, COM S 211 focuses on perfecting programming skills in a conventional imperative programming language. Corrective transfers between COM S 211 and 212 (in either direction) are encouraged during the first few weeks of instruction.

COM S 214 A Taste of UNIX and C
Fall, spring. 1–2 credits. Prerequisite: COM S 211 or equivalent programming experience. This course will not be offered after 1995–96.
A brief introduction to the UNIX operating system and the C programming language. Recommended for students who intend to pursue the computer science major. Taught in the first four to eight weeks of the semester. The 2-credit version involves an implementation project.

COM S 222 Introduction to Scientific Computation (also ENGRD 222)
Spring. 3 credits. Prerequisites: COM S 100 and pre/corequisite of MATH 221 or MATH 293.
An introduction to elementary numerical analysis and scientific computation. Topics include interpolation, quadrature, linear and nonlinear equation solving, least-squares fitting, and ordinary differential equations. The Matlab computing environment is used. Vectorization, efficiency, reliability, and stability are stressed. Special lectures on parallel computation and high-performance Fortran.

COM S 280 Discrete Structures
Fall, spring. 4 credits. Prerequisite: COM S 312 or permission of instructor.
Covers mathematical aspects of programming and computing. Topics will be chosen from the following: mathematical induction; logical proof; propositional and predicate calculus; combinatorics and discrete mathematics covering manipulation of sums, recurrence relations, and generating-function techniques; basic number theory; sets, functions, and relations; partially ordered sets; graphs.

COM S 314 Introduction to Digital Systems and Computer Organization
Fall, spring, summer. 4 credits. Prerequisite: COM S 211, 212, or equivalent.
Introduction to computer organization. Topics include representation of information, machine-assembly languages, processor organization, interrupts and I/O, memory hierarchies, combinatorial and sequential circuits, data path and control unit design, RTL, and microprogramming.

COM S 381 Introduction to Theory of Computing
Fall. 4 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and COM S 481. Collective transfers between COM S 381 and COM S 481 (in either direction) are encouraged during the first few weeks of instruction.
An introduction to modern theory of computing: automata theory, formal languages, and effective computability.

COM S 400 The Science of Programming
Spring. 4 credits. Prerequisite: COM S 280 or equivalent. Not offered spring 1996; next offered spring 1997.
The practical development of correct programs based on the conscious application of principles that are derived from a mathematical notion of program correctness. Besides dealing with conventional sequential programs, the course covers implementations of abstract data types and contains an introduction to problems with concurrency. Issues in programming-language design that arise from program correctness are discussed. Programs are written but not run on a computer.

COM S 401 Software Engineering: Technology and Technique
Fall. 4 credits. Prerequisite: COM S 410 and knowledge of the C programming language.
An introduction to the programming language, tools, and methods used in modern software development. Programming methodologies: modularity, data abstraction, object-oriented programming. Effective use of C++. Programming tools, software libraries, and interface definition languages. General techniques will be complemented with programming experience.

COM S 410 Data Structures
Fall, spring, summer. 4 credits. Prerequisite: COM S 280 or permission of instructor.
Lists, trees, graphs, arrays, and other forms of data structure and their implementation. Relationship between language and data structure, emphasizing abstract data types. Dynamic storage allocation and memory management. Detailed study of searching and sorting methods. Analysis to determine the more efficient algorithm in a given situation.

COM S 411 Programming Languages and Logics
Fall. 4 credits. Prerequisite: COM S 410 or permission of instructor. Not offered fall 1995; next offered fall 1996 and 1998.
The major concepts of programming languages, with emphasis on synthesis and interpretation. Language-based programming methodologies, including object-oriented, functional, and logic programming. Design and criticism of programming languages. Type theory and typed lambda-calculus. Exercises in several unusual programming languages.

COM S 412 Introduction to Compilers and Translators
Overview of the internal structure of modern compilers, with emphasis on implementation techniques. Topics covered include lexical scanning, simple parsing techniques, symbol-table manipulation, type-checking, routine code generation, and simple optimizations. The course entails a compiler implementation project.

COM S 413 Practicum in Compilers and Translators
A compiler implementation project related to COM S 412.

COM S 414 Systems Programming and Operating Systems
Fall. 3 credits. Prerequisite: COM S 314 or permission of instructor.
An introduction to the logical design of systems programs, with emphasis on multiprogrammed operating systems. Topics include process synchronization, deadlock, memory management, input-output methods, information sharing, protection and security, and file systems. The impact of network and distributed computing environments on operating systems is also discussed.

COM S 415 Practicum in Operating Systems
Fall. 2 credits. Prerequisite: COM S 410. Corequisite: COM S 414.
The practical aspects of operating systems are studied through the design and implementation of an operating system kernel that supports multiprogrammed virtual memory, and various input-output devices. All the programming for the project is in a high-level language.

COM S 417 Computer Graphics and Visualization (also ARCH 374)
Spring. 3 credits. Prerequisites: COM S 211 or 212.
An introduction to the principles of interactive computer graphics and scientific visualization. Topics include surface modeling, animation, perspective transformations, hidden-line and hidden-surface algorithms, lighting models, image synthesis, and application to scientific data analysis.

COM S 418 Practicum in Computer Graphics (also ARCH 375)
Spring. 2 credits. Enrollment limited. Permission of instructor. Prerequisite: COM S 211 or 212. Recommended: COM S 314, COM S 417.
Programming assignments dealing with interactive computer graphics and visualization of scientific data.

COM S 421 Numerical Analysis
Fall. 4 credits. Prerequisites: Mathematics 294 or equivalent, one additional mathematics course numbered 300 or above, and knowledge of programming. Modern algorithms for systems of linear equations, systems of nonlinear equations, numerical optimization, and numerical solution of differential equations. Some discussion of methods suitable for parallel computation.

COM S 422 Parallel Computing for Scientific Problems
Spring. 4 credits. Enrollment limited. Permission of instructor. Prerequisites: Math 294, COM S 222 or COM S 421, knowledge of C and FORTRAN.
Parallel algorithms and programming environments for important scientific problems, such as fluid flow, systems of particles, and large-scale optimization. The course will involve a compiler development on some of the world's fastest computers, including a Connection Machine and a hypercube.

COM S 431 Systems and Computer Organization
Fall. 4 credits. Prerequisite: COM S 211 or equivalent programming experience. An introduction to the assembly and operating systems of some of the world's fastest computers, including a Connection Machine and a hypercube.
Current trends in programming languages, with emphasis on programming methodologies supported by languages. Topics will include object-oriented programming, modularity and data abstraction, functional and declarative programming, concurrence, logic programming, and programming language design. There will be programming exercises in several new languages.

COM S 514 Practical in Distributed Systems
Fall or spring. 4 credits. Prerequisites: COM S 414 or permission of instructor. Not offered every year; semester to be announced.
Practical issues in designing and implementing distributed software. Topics include local and wide-area network protocols, replicated data, dynamic reconfiguration, monitoring for and reacting to failures or recoveries, distributed computation, synchronization, and techniques for expressing coarse-grained parallelism at the application level.

COM S 515 Practicum in Distributed Systems
Fall or spring. 1–2 credits. Co-requisite: COM S 514. Not offered every year; semester to be announced.
The practical aspects of distributed systems are studied through the design and implementation of a significant system. Students may work alone or in teams. The project varies from year to year, at the discretion of the instructor.

COM S 516 High-performance Computer Architecture
Spring. 4 credits. Prerequisite: COM S 414 or 411 highly recommended.
Introduces techniques used in high-performance computer architecture. Covers pipelining of instruction execution to superscalar, superpipelined, and speculative architectures; memory system design, including caches, operating system support in the form of naming and protection schemes; introduction to parallel architectures.

COM S 522 Parallel Computing for Scientific Problems
For description, see COM S 422.

COM S 562 Robotics and Machine Vision Lab
Spring. 2 credits. Prerequisites: permision of instructor, COM S 410, and COM S 381. Co-requisite: COM S 462.
For description, see COM S 462.1

COM S 563 Robotics and Machine Vision
For description, see COM S 463.

COM S 572 Introduction to Automated Reasoning
Spring. 3 credits. Prerequisites: permission of instructor, COM S 410, and COM S 381/481.
Not offered spring 1996; next offered spring 1997.
For description, see COM S 463.

COM S 573 Practicum in Artificial Intelligence
Fall. 2 credits. Prerequisite: COM S 107 or COM S 212, COM S 280 and COM S 410. Corequisite: COM S 472.
Project portion of COM S 472. Topics include Common LISP programming, representation systems, deductive retrieval, databases and frame languages, and truth-maintenance-system implementations.

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits. Prerequisite: COM S 107 or COM S 212, COM S 280 and COM S 410. Corequisite: COM S 472.
Project portion of COM S 472. Topics include Common LISP programming, representation systems, deductive retrieval, databases and frame languages, and truth-maintenance-system implementations.

COM S 481 Introduction to Theory of Computing
Fall. 4 credits. Prerequisite: COM S 280 or permission of instructor. Credit will not be granted for both COM S 381 and COM S 481. Corrective transfers between COM S 481 and COM S 381 (in either direction) are encouraged during the first few weeks of instruction.
A faster-moving and deeper version of COM S 381.

COM S 482 Introduction to Analysis of Algorithms
Spring. 4 credits. Prerequisites: COM S 410 and either 381 or 481, or permission of instructor. Techniques used in the creation and analysis of algorithms. Combinatorial algorithms, computational complexity, NP-completeness, and intractable problems.

COM S 486 Applied Logic (also Mathematics 486)
Fall or spring. 4 credits. Prerequisites: Mathematics 222 or 294, COM S 100, and some additional course in mathematics or theoretical computer science.
Topics in Prolog, LISP, ML, or Nuprl. Applications to expert systems and program verification.

COM S 490 Independent Reading and Research
Fall, spring. 1–4 credits.
Independent reading and research for undergraduates.

COM S 501 Software Engineering: Technology and Techniques
Fall. 4 credits. Prerequisite: COM S 410 and knowledge of the C programming language.
An introduction to the programming languages, tools, and methods used in modern software development. Programming methodologies: modularity, data abstraction, object-oriented programming. Effective use of C++. Programming tools, software libraries, and interface definition languages. General techniques will be complemented with programming experience.

COM S 511 Modern Programming Languages
Fall. 4 credits. Prerequisites: COM S 410 and a project course or permission of instructor. Not offered fall 1995; next offered fall 1996 and 1998.

COM S 444 Distributed Systems and Algorithms
Fall 4 credits. Corequisite: COM S 414 or permission of instructor. Not offered fall 1995; next offered fall 1996.
The fundamentals of distributed systems and algorithms. Topics include the problems, methodologies and paradigms necessary for understanding and designing distributed applications, with an emphasis on fault-tolerant computing. Theoretical concepts will be complemented with practical examples of their application in current distributed systems.

COM S 462 Robotics and Machine Vision
Introduction to the science of robotics and machine vision using a combination of programming techniques, applied mathematics, algorithms, and lab experiments. Topics include traditional robot planning and programming, hand-eye systems, feature detection and object recognition, motion planning, shape reconstruction, compliant motion and assembly, model-based planning and recognition, uncertainty and error, active sensing, and manipulation.

COM S 463 Robotics and Machine Vision Lab
Spring. 2 credits. Prerequisite: Permission of instructor, COM S 410, and COM S 381. Co-requisite: COM S 462.
Not offered spring 1996; next offered spring 1997. 1 lab.
Use physical robots (vision systems, hand-eye systems, and mobile robots) in the Computer Science Robotics and Vision Teaching Laboratory. Students should be comfortable with mathematics and programming, know LISP or Scheme, have a strong background in algorithms, and an ability to work independently.

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits. Prerequisites: COM S 107 or COM S 212, COM S 280 and COM S 410. Open to juniors, seniors, and graduate students. 3 lecs.
A challenging introduction to the major subareas and current research directions in artificial intelligence. Topics include knowledge representation, search, problem solving, natural-language processing, vision, robotics, logic and deduction, planning, and machine learning.

COM S 433 Practicum in Database Systems
Spring. 2 credits. Corequisite: COM S 452.
Issues related to the design and implementation of database-management systems will be addressed. Students will implement a simplified relational database system, including a file-access method and query-processing algorithms.

COM S 432 Introduction to Database Systems
Fall or spring. 4 credits. Corequisite: COM S 432.

COM S 410. Open to juniors, seniors, and graduate students. 3 lecs.
A challenging introduction to the major subareas and current research directions in artificial intelligence. Topics include knowledge representation, search, problem solving, natural-language processing, vision, robotics, logic and deduction, planning, and machine learning.
COM S 600 Computer Science and Programming
Fall. 4 credits. Prerequisites: COM S 410 and 381 or 481, or permission of instructor. A study of programming paradigms, functional, imperative, and logic programming. The untyped lambda-calculus. The typed lambda-calculus, type systems, polymorphism, type inference, and formal semantics of programming languages. Elements of domain theory and type theory. Models of programming logic.

COM S 611 Advanced Programming Languages
Fall. 4 credits. Prerequisites: COM S 410 and 412 or permission of instructor. Advanced techniques in, and models of, concurrent systems. Synchronization of concurrent processes; parallel programming languages; deadlock; verification.

COM S 612 Compiler Design for High-Performance Architectures
Spring. 4 credits. Prerequisites: COM S 314 and 412 or permission of instructor. Compiler design for pipelined and parallel architectures. Program analysis: data and control dependencies, dataflow analysis, efficient solution of dataflow equations, dependence tests, solution of Diophantine equations. Architecture and code generation for instruction-level parallel (ILP) processors: pipelined, VLIW and superscalar architectures, code reorganization and software pipelining. Architecture and code generation for multiprocessor; shared- and distributed-memory architectures, latency tolerance and avoidance, loop transformations to enhance parallelism and locality of reference.

COM S 613 Concurrent Programming
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor. Advanced techniques in, and models of, concurrent systems. Synchronization of concurrent processes; parallel programming languages; deadlock; verification.

COM S 614 Advanced Systems
Spring. 4 credits. Prerequisite: COM S 414 or permission of instructor. An advanced course in systems, emphasizing contemporary research in distributed systems. Topics may include communication mechanisms, consistency in distributed systems, fault-tolerance, knowledge and knowledge-based protocols, performance, scheduling, concurrency control, and authentication and security issues.

COM S 615 Theory of Concurrent Systems
Spring. 4 credits. Prerequisites: COM S 613 or permission of instructor. Not offered every year; semester to be announced. Modeling, specification, and verification of concurrent systems. Topics in modeling will include: interleaving vs. partial-order semantics, and linear time vs. branching time. Among the specification methods discussed are: temporal logic, automata, process algebra, and Petri nets. Verification methods include proof calculi, model checking, and refinement mappings. Advanced topics will include open systems and real time.

COM S 617 Frontiers of Parallel Computer Systems
Fall. 4 credits. Prerequisites: COM S 411, 412, or 414. Not offered every year; semester to be announced. Focus on the architecture, compiler, and operating system aspects required to support features taken for granted in sequential computing, such as portable parallel programs, powerful debuggers, multi-user machine access, virtual memory, and fast I/O.

COM S 618 Topics in the Theory of Distributed Systems
Fall. 4 credits. Prerequisites: COM S 444 or COM S 614 or permission of instructor. Not offered every year; next offered fall 1995. This course focuses on research in distributed systems and algorithms. It covers the fundamental properties that characterize some of the latest results and open questions in both message-passing and shared-memory systems. Problems will be viewed from a theoretical standpoint with an emphasis on precise specifications, proofs of correctness, upper and lower bounds on various complexity measures and impossibility results.

COM S 621 Matrix Computations
Fall. 4 credits. Prerequisites: Mathematics 411 and 431 or permission of instructor. Stable and efficient algorithms for linear equations, least squares, and eigenvalue problems. Direct and iterative methods are considered. The Matlab system is used extensively.

COM S 622 Numerical Optimization and Nonlinear Algebraic Equations
Spring. 4 credits. Prerequisite: COM S 621. Modern algorithms for the numerical solution of multidimensional optimization problems and simultaneous nonlinear algebraic equations. Emphasis is on efficient, stable, and reliable numerical techniques with strong global convergence properties. Topics may include quasi-Newton methods, modified Newton algorithms, and trust-region procedures. Special topics may include large-scale optimization, quadratic programming, and numerical approximation.

COM S 624 Numerical Solution of Differential Equations
Spring. 4 credits. Previous exposure to numerical analysis, mathematical analysis including Fourier methods, and differential equations. Not offered every year; semester to be announced. Finite difference and spectral methods for the solution of differential equations. A fast-moving course that begins with a three-week survey of numerical methods for ODEs, then moves on to Fourier analysis and methods for PDEs, especially parabolic and hyperbolic equations. Other topics covered include: numerical stability, the treatment of boundary conditions, and multigrid methods. This course combines theory and programming (in Matlab), emphasizing fundamental principles more than applications.

COM S 631 Multimedia Systems
Fall. 4 credits. Prerequisites: COM S 414 or permission of instructor. Hardware and software issues involved in computer manipulation of audio, video, and images. Topics include media capture, representation, compression, editing, processing, storage, and transportation. Special emphasis on the programming of digital video, including algorithms for special effects and automatic extraction of content, and applications of parallel architectures to video processing.

COM S 635 Automatic Text Processing and Information Retrieval
Spring. 4 credits. Prerequisite: COM S 410 or equivalent or permission of instructor. Letter grade only. Modern methods for natural language text processing. Topics include text analysis, storage and retrieval, automatic spelling aids, text compression and encryption, language understanding systems, automatic abstracting, and text generation and translation.

COM S 661 Robotics
Fall. 4 credits. Prerequisites: COM S 482 and permission of instructor. Not offered every year; semester to be announced. State-of-the-art in experimental robotics, with an emphasis on robot-motion planning. Topics include: Task-level robot planning, collision-free path planning, grasp synthesis, modeling and propagating uncertainty, planning compliant motions for precision assembly, geometrical planning theories, motion planning with dynamics (and dynamic constraints), computational complexity of robot-motion planning, computational theories of friction, impact, and the physics of manipulation, and error detection and recovery in robotics.

COM S 662 Robotics Laboratory
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered every year; semester to be announced. Introduction to the use of equipment and techniques in a modern robotics laboratory. Includes robot programming, force sensing, compliant motion, and mechanical assembly.

COM S 664 Machine Vision
Spring. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and Math 221 or equivalent. An introduction to computer vision. The following topics will be covered: edge detection, image segmentation, stereopsis, motion and optical flow, shape reconstruction, shape representations and extracting shapes from images, model-based recognition. Students will be required to implement several of the algorithms covered in the course and evaluate them on both synthetic and real images.

COM S 672 Advanced Artificial Intelligence
Spring. 4 credits. Prerequisite: COM S 472 or permission of instructor. Not offered every year; semester to be announced. Advanced course in the computational study of intelligent behavior. Covers current issues in the design and implementation of agents that operate in the face of limited computational, perceptual, and effector resources. How agents choose action (planning) and how they improve action choice using feedback from the world (learning) are the chief topics. Heuristic search with limited resources, planning in dynamic worlds, representations change, reasoning under uncertainty, active learning, knowledge
COM S 681 Analysis of Algorithms  
Fall. 4 credits. Prerequisite: COM S 381 or 481, or permission of instructor.  
Methodology for developing efficient algorithms, primarily for graph-theoretic problems. Understanding of the inherent complexity of natural problems via polynomial-time algorithms, randomized algorithms, NP-completeness, randomized reducibilities. Additional topics such as parallel algorithms and efficient data structures.

COM S 683 Parallel Algorithms  
Fall. 4 credits. Prerequisite: COM S 381 or 481, or permission of instructor.  
Advanced treatment of theory of computation, computational-complexity theory, and other topics in computing theory.

COM S 684 Introduction to Symbolic Computation  
Spring. 4 credits. Prerequisites: COM S 381 or 481, or permission of instructor.  
Not offered every year; semester to be announced.  
Introduction to the algorithms used for algebraic problems in symbolic computing and their mathematical and complexity theoretic foundations. Topics include simplication of, and arithmetic operations with, continued fractions, polynomials, rational functions and elements of algebraic extensions, polynomial factorization, and techniques for questions in algebraic geometry. Related topics may also be included.

COM S 685 Computational Geometry  
Fall. 4 credits. Prerequisite: COM S 681 or permission of instructor.  
The study of algorithms for geometric problems. Topics include: convex hulls, arrangements of lines, planes and hyperplanes, intersection problems, triangulations, proximity (Voronoi diagrams and Delaunay triangulations), geometric searching, randomized algorithms, parallel algorithms, and geometric optimization.

COM S 709 Computer Science Colloquium  
Fall, spring. 1 credit. S-U grades only.  
For staff, visitors, and graduate students interested in computer science.

A weekly meeting for the discussion and study of important topics in the field.

COM S 713 Seminar in Systems and Methodology  
Fall, spring. 4 credits. Prerequisites: a graduate course employing formal reasoning such as COM S 600, 611, 613, 615, 671, a logic course, or permission of instructor.  
Not offered every year; semester to be announced.  
Discussion of contemporary issues in the design and analysis of computing systems. Emphasis on the proper use of rigor, models, and formalism.

COM S 715 Seminar in Programming Refinement Logics  
Fall, spring. 4 credits. Prerequisite: permission of instructor.  
Topics in programming logics, possibly including type theory, constructive logic, decision procedures, heuristic methods, extraction of code from proofs, and the design of proof-development and problem-solving systems.

COM S 717 Topics in Parallel Architectures  
Fall. 4 credits. Prerequisite: COM S 612 or permission of instructor.  
Not offered every year; semester to be announced.  
Covers topics in parallel computers. Material includes: architectures of parallel computers, parallelizing compilers, operating systems for parallel computers, and languages (functional and logic-programming languages) designed for parallel computation.

COM S 718 Topics in Computer Graphics  
Fall or spring. 4 credits. Prerequisite: COM S 417 or permission of instructor.  
Not offered every year; semester to be announced.  
Covers topics in computer graphics and applications of computer graphics to scientific computation.

COM S 719 Seminar in Programming Languages  
Fall, spring. 4 credits. Prerequisite: COM S 611 or permission of instructor.  
S-U grades only.

COM S 722 Topics in Numerical Analysis  
Fall or spring. 4 credits. Prerequisite: COM S 621 or 622 or permission of instructor.  
Not offered every year; semester to be announced.  
Topics are chosen at instructor’s discretion.

COM S 729 Seminar in Numerical Analysis/ACRI  
Fall, spring. 1–4 credits (to be arranged).  
Prerequisite: permission of instructor. S-U grades only.

COM S 739 Seminar in Text Processing and Information Retrieval  
Fall, spring. 4 credits. Prerequisite: COM S 635 or permission of instructor.  
S-U grades only.

COM S 754 Seminar in Work-In-Progress Distributed Systems  
Fall or spring. 1 credit.

COM S 761 Dynamic Manipulation and Scientific Computation  
Spring. 4 credits. Prerequisites: COM S 462 or 661, a strong background in robotics and algorithms (e.g., COM S 481), and permission of the instructor.  
Not offered every year; semester to be announced.

COM S 762 Robot Café  
Spring. 4 credits. Prerequisite: COM S 661.  
Not offered every year; semester to be announced.  
Advanced seminar on varying topics.

COM S 773/774 Proseminar in Cognitive Studies I & II (also Cognitive Studies, Philosophy, Linguistics, and Psychology 773/774)  
Fall and spring. 2 credits.  
This is a year-long lecture-and-discussion course that is intended to give graduate students with an interdisciplinary introduction to the study of knowledge, its presentation, acquisition, and use. Topics may include the psychology of perception and cognition, the philosophy of mind, language, and knowledge; the phonology, syntax, and semantics of natural language; computational approaches to natural language processing, vision, and reasoning; parallel distributed processing; and neuropsychology.

COM S 789 Seminar in Theory of Algorithms and Computing  
Fall, spring. 3 credits. Prerequisite: permission of instructor.  
S-U grades only.

COM S 790 Special Investigations in Computer Science  
Fall, spring. 2–4 credits.  
Prerequisite: permission of a computer science adviser.  
Letter grade only.  
Independent research or Master of Engineering project.

COM S 799 Special Investigations in Computer Science  
Fall, spring. 2–4 credits.  
Prerequisite: permission of a computer science adviser.  
S-U grades only.  
Doctoral research.

Most work in dynamic manipulation, an important new area in robotics, uses computer-controlled devices, and yet has been non-computational in flavor. This course surveys the field and attempts to apply methods from numerical and symbolic computation to cast the field into a precise framework and place it on a firm algorithmic footing. Required readings include papers by a variety of researchers.

COM S 890 Special Investigations in Computer Science  
Fall, spring. 2–4 credits.  
Prerequisite: permission of a computer science adviser.  
S-U grades only.  
Doctoral research.

ELECTRICAL ENGINEERING Core Courses  
ELE E 210 Introduction to Electrical Systems (also ENGRD 210)  
Fall, spring. 3 credits. Corequisites: Mathematics 294 and Physics 213.  
For description, see Engineering Common Courses.
ELE E 215 Electrical Engineering Laboratory I
Spring. 3 credits. Co-requisite: ENGR 210. Letter grade only. Basic systematic and electronic instrumentation. Measurement and design involving circuits with both active and passive elements; characterization of semiconductor devices. Introduction of the personal computer as a laboratory aid. Technical report writing and communication skills.

ELE E 230 Introduction to Digital Systems (also ENGR E 230)
Fall, spring. 4 credits. Prerequisite: COM S 100. For description, see Engineering Common Courses.

ELE E 301 Electrical Signals and Systems I
Fall. 4 credits. Prerequisites: a grade of at least C+ in ENgr 210 and C in Mathematics 292 and 294. Continuous- and discrete-time signals and systems; Fourier series and transforms; bilateral Laplace and z transforms; convolution; PDEs and Fourier series applications to modulation, filtering, and sampling.

ELE E 302 Electrical Signals and Systems II
Spring. 4 credits. Prerequisite: ELE E 301. Linear time-invariant systems as models for electrical networks; network topology; nodal analysis, loop analysis, modified nodal analysis, and state variable analysis; unilateral Laplace transforms for solving vector differential equations; elementary nonlinearities.

ELE E 303 Electromagnetic Fields and Waves
Fall. 4 credits. Prerequisites: grades of C or better in Physics 213, 214, and Mathematics 294. Electrostatics, magnetostatics, quasistatics; electromagnetic energy and force; Maxwell's equations in integral and differential form; Poynting's theorem; wave equation; plane electromagnetic waves, phase and group velocities, dispersive media; wave reflection and transmission; dielectric and conducting interfaces; guided waves on finite-transmission lines; transient pulse propagation.

ELE E 304 Electromagnetic Fields and Applications
Spring. 4 credits. Prerequisite: ELE E 303. Theory of electromagnetic fields and waves building on the foundations established in ELE E 303. Recommended for students interested in wireless communication, high data rate electronics, space based communications systems and fiber optics. Review of Maxwell's equations, boundary conditions, vector and scalar potentials, electromagnetic waves, and the wave equation. Theory of electromagnetic waves including transmission lines, waveguides, and fiber optic guides. Cavities, radiation from dipoles and arrays of dipoles, and other transmitting-receiving systems. If time permits, this will be included on wave propagation in anisotropic media such as the near space regions of the earth, crystals, and ferrites.

ELE E 306 Fundamentals of Quantum and Solid-State Electronics
Spring. 4 credits. Prerequisites: Physics 214 and Mathematics 292. Introductory quantum mechanics and solid-state physics necessary for understanding lasers and modern solid-state electronic devices. Quantum mechanics is presented in terms of wave functions, operators, and solutions of Schroedinger's equation. Topics include the formalism and methods of quantum mechanics, the hydrogen atom, the structure of simple free molecules, periodic bands, Fermi-Dirac statistics, and the basic physics of semiconductors. Applications studied include a simple metal, thermionic emission, and the p-n junction.

ELE E 308 Fundamentals of Computer Engineering
Spring. 4 credits. Prerequisite: ELE E 230 and CS 211. An introduction to foundations of computer engineering: structured computer organization; assembly language programming; data structures and algorithms; computer arithmetic. Practical applications of these concepts.

ELE E 310 Introduction to Probability and Random Signals
Spring. 4 credits. Prerequisite: Mathematics 294. This course may be used in place of ENgr 210 to help satisfy the engineering distribution requirement. It can then also meet a field breadth requirement if 3 additional credits of field approved or out-of-field elective are taken.

Introduction to the theory of probability as a basis for modeling random phenomena and signals, calculating the response of systems incorporating these models, and making estimates, inferences, and decisions in the presence of chance and uncertainty. Applications of these models will be given in such areas as communications, control, and device modeling. Specific topics include the basic concepts of probability and its representations through densities, cumulative distribution functions, probability mass functions, and characteristic functions; conditional probability; independence; scalar and vector random variables and nonlinear transformations of data; expectation, conditional expectation, moments, correlation; laws of large numbers and central limit theorem; linear and nonlinear mean square estimation; Bayes and Neyman-Pearson decision making.

ELE E 315 Electronic Circuit Design
Fall. 4 credits. Prerequisites: ELE E 210 and ELE E 215. Design of electronic circuits for applications such as computers, signal processing, communication, microelectronics, optoelectronics, measurements/sensing, power electronics and control. Top-down approach starting from device specifications. Circuits with analog, digital, and mixed analog/digital functions. Introduction to design of electronic building blocks and extensive discussion of circuit design with existing building blocks. Design approach based on first order estimation, analytic equations, and circuit simulation. The laboratory environment includes the following computer-aided functions: design; instrumentation; data acquisition and analysis; simulation; verification, and testing; reporting and presentation.

Computer Engineering
ELE E 423 Computer Methods for Circuit Simulation
Fall. 4 credits. Prerequisite: ELE E 302. Satisfies undergraduate computer applications requirement. Numerical techniques presented in the context of circuit simulation. Solution of linear and nonlinear algebraic equations; integration; solution of ordinary differential equations; alternative forms of circuit-equation formulation. Starting from a program to simulate simple, linear passive, steady-state circuits, the instructor will add, and the students improve on, procedures that will finally result in a nonlinear transient integrated-circuit simulator that involves most of the techniques discussed in class.

ELE E 439 VLSI Digital System Design
Fall. 4 credits. Prerequisites: EE 230 and EE 315. Custom VLSI design as seen by a system designer. Emphasis on structured design methodologies for VLSI systems. Topics include MOS transistors, design rules for MOS integrated circuits, implementation of common digital components, clocking disciplines for VLSI tools for computer-aided design, system design for performance, and novel architectures for VLSI systems.

ELE E 539 Practicum in VLSI Design
Fall and spring (year-long course). 2 credits each semester. Prerequisites: EE 475 or consent of instructor. Corequisites: EE 439.
A year-long implementation project related to EE 439. Students will design a chip and have it fabricated in the fall semester and test it for functionality and performance in the spring semester. Students are required to take the course both fall and spring.

ELE E 445 Computer Networks and Telecommunications
Fall. 4 credits. Prerequisites: ELE E 308 (or COM S 314) and a course in probability. Design, analysis, and implementation of local area networks, wide area networks, and telecommunications systems; circuit switching, packet switching, broadband band switching; protocols; asynchronous transfer mode systems.

ELE E 475 Computer Structures
Fall. 4 credits. Prerequisite: ELE E 308 (or COM S 280 and 314), ENGRD 230. Methods of designing digital computers and the software-software interface to the systems they function with. Topics will include types of control sequencers, memory and I/O organization and interfacing, interrupt hardware design, floating-point hardware and basic architectural alternatives. Laboratory groups will design and build a small digital computer. User-programmable logic devices will be employed for circuit implementation.

ELE E 476 Digital Systems Design Using Microcontrollers
Spring. 4 credits. Prerequisite: ELE E 308 or COM S 314 (ELE E 475 strongly recommended). Design of real-time digital systems using microprocessor-based embedded controllers. Students working in pairs will design, debug, and construct several small systems that illustrate and employ the techniques of digital system design acquired in previous courses. The content focuses on the laboratory work, the lectures being used primarily for the introduction of examples, description of specific modules to be designed, and instruction in the hardware and high-level design tools to be employed. The laboratory environment is that of ELE E 475 enhanced with the addition of an integrated single-board computer based on the 80C196KB.
microcontroller chip. Programming is in assembly language and (optionally) C.

**ELE E 524 Numerical Methods for the Electrical Engineer**
Spring. 4 credits. Prerequisites: ELE E 301 and ELE E 303. ELE E 423 is helpful. A working knowledge of a scientific programming language is required. Open to both undergraduates and graduates. Satisfies undergraduate computer applications requirement. Alternate years. Numerical methods for ordinary and partial differential equations are presented using examples from different areas of electrical engineering. Examples include semiconductor-device simulation, plasma simulation, propagation of solutions in optical fibers, and the modeling of electrostatic fields in micromechanical devices. Numerical methods include particle-in-cell simulation techniques; spectral methods; elementary parabolic, elliptic, and hyperbolic methods; and the boundary-element method. The fundamental notions of accuracy and error, consistency, stability, and convergence are discussed.

**ELE E 541 Advanced Computer Architectures**
Fall. 3 credits. Prerequisite: ELE E 308 (or COMS 280 and 314). Design and evaluation of processor architectures are examined in the light of actual implementations. Topics include parallel and pipelined architectures, interleaved memories, cache and virtual memories, I/O processors, vector and array processors, protection mechanisms, and RISC architectures.

**ELE E 542 Parallel Processing**
Spring. 3 credits. Prerequisite: ELE E 541. Parallel computer systems that are designed to provide a high computation rate for large specific problems are studied. Topics include computer architecture, interconnection networks, performance characterization, basic algorithms, and parallel programming techniques. Recent multiprocessors and massively parallel processors are also discussed.

**ELE E 547 Computer Vision**
Fall. 4 credits. Prerequisites: ELE E 308 (or COM S 280 and 314) or consent of instructor. Computer acquisition and analysis of image data with emphasis on techniques for robot vision. Computer vision is the construction of explicit meaningful descriptions of physical objects from images. This course will concentrate on descriptions of objects at three levels of abstraction: segmented images (images organized into subimages that are likely to correspond to interesting objects), geometric structures (quantitative models of images and world structures), and relational structures (complex symbolic descriptions of images and world structures). The programming of several computer-vision algorithms will be required.

**ELE E 548 Digital Image Processing**
Spring. 3 credits. Prerequisites: ELE E 510, ELE E 425. Familiarity with linear algebra. Introduction to image processing through four major topics: enhancement, analysis, compression, and restoration. Special attention is allocated to compression. Equal emphasis will be placed on gaining a mathematical and an intuitive understanding of algorithms through actual image manipulation and viewing.

**ELE E 520 The Audio Engineering Laboratory: An Introduction To Audio Signal Processing**
Spring. 3 credits. Prerequisites: ELE E 301 and ELE E 315. Not offered 1995-96. Hands-on laboratory experience in applying signals and systems concepts. Students are paired into teams; each team designs, constructs, and tests simple analog and digital audio circuits and programs. The course builds intuition in signal processing, valuable not only for audio, but also for general communication and control systems. In addition, students develop critical technical writing and presentation skills.

**ELE E 425 Digital Signal Processing**
Fall. 4 credits. Prerequisite: ELE E 301. Fundamentals of signal analysis, review of Fourier, Laplace, and Z transforms. Sampling theory. Multirate signal processing. Discrete Fourier transform properties and computation (FFT). Digital filter design; the approximation problem for FIR and IIR filters, the realization problem for finite-word-length limitations and filter structures.

**ELE E 426 Applications of Signal Processing**
Spring. 3 or 4 credits. Prerequisite: ELE E 425. Applications of signal processing, including signal analysis, filtering, and signal synthesis. The course is laboratory oriented and emphasizes individual student projects. Design is done with signal-processing hardware and by computer simulation. Topics include filter design (principally digital filtering) and spectral analysis as well as speech coding, speech processing, digital recording, adaptive noise cancellation, and digital signal synthesis.

**ELE E 521 Theory of Linear Systems**
Fall. 4 credits. Prerequisite: ELE E 502 or permission of instructor. Recommended: a good background in linear algebra and linear differential equations. State-space and multi-input-multi-output linear systems in discrete and continuous time. The state transition matrix, the matrix exponential, and the Cayley-Hamilton theorem. Controllability, observability, stability, realization theory. At the level of Linear Systems, by T. Kailath.

**ELE E 522 Nonlinear Systems: Analysis, Stability, Control, and Applications**
Spring. 4 credits. Prerequisites: ELE E 521 or a solid background in linear algebra and real analysis strongly recommended but not required. A fairly rigorous introduction to nonlinear systems, including nonlinear differential equations, flows, phase-plane analysis, fundamental Lyapunov theory, LaSalle's Theorem, regions of attraction, slowly varying systems, advanced stability theory, Lyapunov redesign, applied nonlinear control, describing functions, averaging and singular perturbations, bifurcation analysis and control and application to physical systems.

**ELE E 525 Adaptive Filtering in Communication Systems**
Fall. 4 credits. Prerequisites: ELE E 425 or 472, or 521, or permission of instructor. Fundamentals of an adaptive filter theory intended for communication systems applications. Three traditional problems are used to motivate adaptive FIR and IIR filter design and to raise open issues of current interest: (1) channel equalization for intersymbol interference removal from distorted digital sources, (2) echo cancellation in 4 wire telephony loops, and (3) speechband signal-source compression via differential pulse code modulation.

**ELE E 526 Advanced Signal Processing**

**Communication and Information Systems**

**ELE E 411 Random Signals in Communications and Signal Processing**
Fall. 3 credits. Prerequisite: ELE E 302 and 310 or equivalent. Introduction to models for random signals in discrete and continuous time: Markov chains, Poisson process, queueing processes, wide-sense stationary processes and power spectral densities, Gaussian random process, including the narrowband case. Electrical engineering phenomena described by such models (e.g., communications channel noise, queues that form in multiple-access telecommunications systems). Response of linear and nonlinear systems to random signals. Elements of estimation and inference as they arise in communications and digital signal processing systems (e.g., problems of extraction of signals from noise via Wiener filtering, power spectral density estimation).

**ELE E 486 Communications Systems I**

**ELE E 651 Error-Control Codes**
Fall. 4 credits. Prerequisite: ELE E 301 or ELE E 521 or equivalent. A strong familiarity with linear algebra is assumed. Not offered 1995-96. An introduction to the theory of algebraic error-control codes. Topics include: Hamming codes, group codes, the standard array, minimum-distance decoding, cyclic codes, and the dual of a linear block code. Methods of shortening and combining codes. Hamming and Singleton bounds for error-correcting codes. Algebra: groups, rings, and fields with special emphasis on Galois or finite field theory. The construction and decoding of Bose-Ray Chauncey-Rothe (BCH) and Reed-Solomon (RS) codes. Two-dimensional cyclic codes and cascaded Reed-Solomon codes. Computer methods for the study of the structure and algorithms for error-control are used.

**ELE E 562 Fundamental Information Theory**
Fall. 4 credits. Prerequisite: ELE E 310 or equivalent.
Fundamental results of information theory with application to storage, compression, and transmission of data. Entropy and other information measures. Block and variable-length codes. Channel capacity and rate-distortion functions. Coding theorems and converses for classical and multiterminal configurations. Gaussian sources and channels.

**ELE E 563 Communication Networks**  
Spring. 4 credits. Prerequisite: ELE E 411 or permission of instructor.  
Classical line-switched communication networks: point-process models for offered traffic; blocking and queuing analyses. Stability, throughput, and delay of distributed algorithms for packet-switched transmission of data over local-area and wide-area nets (LANs and WANS); TDMA, FDMA, ALOHA, slotted ALOHA, Ethernet, reservation, tree, and interval-searched contention resolution protocols. Flow control and capacity assignment algorithms for wideband circuit-switched and ATM networks.

**ELE E 564 Decision Making and Estimation**  
Fall. 4 credits. Prerequisite: Caregistration in ELE E 411. Not offered 1995–96.  
An introduction to those methods of making rational decisions and inferences and of forming estimates that are central to problems of communications, detection, pattern recognition, and statistical signal processing. Topics include Bayes, minimax, and Neyman–Pearson decision theories; Bayes and maximum likelihood point estimation; Cramer–Rao bound, efficient, and consistent estimation; spectral estimation, and robust models for signal extraction.

**ELE E 567 Communication Systems II**  
Spring. Offered as 2 or 4 credits.  
Prerequisites: ELE E 562. Fundamental topics in modern digital communication. Analytical and computational tools required to understand modern data conversion, transmission, and storage systems. Possible topics include: PCM, DPCM, PAM, PSK, FSK, matched filtering, equalization, line codes, trellis codes, Viterbi decoding, applications to audio, video, and magnetic recording. Vector quantization and universal data compression including L2, L2W, and arithmetic coding, applied to files, speech, images, and video.

**ELE E 577 Artificial Neural Networks**  
Fall. 4 credits. Prerequisites: ELE E 310; ELE E 411 recommended.  
Artificial neural networks are brainlike in being formed out of many highly interconnected nonlinear memoryless elements. Probability theory will provide the primary analytical approach to design and analysis of neural networks. The course will cover capabilities of feed-forward nets (multilayer perceptrons) that can serve as pattern classifiers, decision-making devices, and controllers, as well as aspects of recurrent feedback/Hopfield nets that can serve as associative memories and combinatorial optimizers. At the level of the current literature.

**ELE E 564 Foundations of Inference and Decision Making**  
Spring. 3 credits. Prerequisite: a course in probability and some statistics, or permission of instructor. Not offered 1995–96.  
An examination of methods for characterizing uncertainty and chance phenomena and for transforming information into decisions and optimal systems. Discussion of the foundations of inference includes topics drawn from comparative probability, interval-valued probability, quantitative probability, relative frequency interpretations, computational complexity, randomness, classical probability and invariance, induction, and subjective probability.

**ELE E 660-669 Random Processes in Electrical Systems**  
669, fall; 668, spring. 3 credits each term. Advanced topics in the general area of randomness and uncertainty and their relevance to the analysis and design of electrical systems.

**Power and Control Systems**

- **ELE E 451-452 Computer-Aided Analysis of Electric Power Systems I and II**  
  451, fall; 452, spring. 4 credits each term.  
  Prerequisite: ELE E 302.  
  Representation of electric power systems; modeling of synchronous machines; transmission lines; transformers; loads, introduction to space matrix techniques, power-flow analysis, economic dispatch, optimal power flow, symmetrical components, fault studies, power-system protection, power-system stability, online power-flow analysis, voltage-control systems, and power-control systems.

- **ELE E 471 Feedback Control Systems**  
  Fall. 4 credits. Prerequisite: ELE E 302 or M&E 326, or permission of instructor.  
  Analysis techniques, performance specifications, and analog-feedback-compensation methods for single-input, single-output, linear, time-invariant systems. Laplace transforms and transfer functions are the major mathematical tools. Design techniques include PID, root-locus, frequency response, and algebraic pole placement. Computer-aided design laboratory examines modeling and control of a computer-simulated dynamic process.

- **ELE E 472 Digital Control Systems**  
  Spring. 4 credits. Prerequisite: ELE E 471 or permission of instructor.  
  Analysis and design of feedback control systems using digital devices to implement compensation. Z-transforms and linear algebra are the major mathematical tools. Topics include: state realizations, digitizations of analog systems, least-squares system identification, state feedback control, observers, combined observer-controller, and algebraic-control design. Assignments will consist of reports on computer-aided controller design and digitally simulated evaluation.

**ELE E 555 Advanced Power Systems Analysis and Control I**  

**ELE E 556 Advanced Power Systems Analysis and Control II**  

**ELE E 573 Optimal Control and Estimation for Continuous Systems**  
Fall. 4 credits. Prerequisite: ELE E 521 or permission of instructor. Not offered 1995–96.  
Control system design through parameter optimization, with and without constraints. The minimum principle; linear regulations, minimum-time and minimal-fuel problems. Computational techniques; properties of Lyapunov and Riccati equations.

**ELE E 574 Estimation and Control in Discrete Linear Systems**  
Spring. 4 credits. Prerequisites: ELE E 521 and 411, or permission of instructor. Not offered 1995–96.  

**ELE E 679 Advanced Topics in Systems and Control**  
1–3 credits. Prerequisite: permission of instructor. Not offered every year.  
Topics include robotics, nonlinear feedback system stability, multivariable control, and qualitative theory on nonlinear systems.

**Solid-State Electronics**

- **ELE E 412 Applied Solid-State Physics**  
  Spring. 4 credits. Prerequisite: ELE E 306.  
  ELE E 407 recommended.  

- **ELE E 433 Microwave Integrated Circuits**  
  Fall. 4 credits; may be taken for 3 credits without laboratory.  
  Prerequisites: ELE E 305 and ELE E 306.  
  An introduction to the design and testing of high-speed circuits (frequencies above 1 GHz). Topics include: computer-aided design, automated microwave measurement techniques, optoelectronic applications, and GaAs monolithic microwave integrated circuits. Six two-week labs cover the basics of designing, fabricating, and testing microwave integrated circuits.
ELE E 453 Integrated Circuit Design
Fall. 4 credits. Prerequisites: ELE E 301 and ELE E 315 or equivalent. ELE E 457 recommended.

ELE E 457 Silicon Semiconductor Electronics
Fall. 4 credits with lab. Prerequisites: ELE E 315 and ELE E 306 or equivalent. Fundamental electronic properties of semiconductors. Energy band diagrams, carrier transport and recombination, pin junctions, metal-semiconductor Schottky contacts, ohmic contacts, and metal-oxide-semiconductor (MOS) structures. Operation of bipolar junction transistors (BJTs) and field effect transistors (FETs). Six two-week labs covering electrical measurements of semiconductor materials and devices.

ELE E 533 Semiconductor Lasers
Spring. 3 credits. Prerequisites: ELE E 430, ELE E 457, or permission of instructor. Study of principles and characteristics of semiconductor lasers. Topics cover laser dynamics, noise, quantum confined structures, single-frequency lasers, traveling-wave lasers, surface-emitting lasers, reliability, and emerging research subjects. A term project and paper will be required.

ELE E 535 Semiconductor Physics
Fall. 4 credits. Prerequisites: ELE E 457 and 407, or permission of instructor. Fundamental semiconductor physics of charge carrier transport and optical characteristics of materials and structures useful in electronic and photonic devices. Crystal structure, energy band structures, carrier effective mass, phonon scattering, surface, and low-field transport, including temperature effects, high-field and ballistic charge carrier transport, electron scattering by phonons in bulk and quantum well structures, optical absorption, reflection, optical emissions, high levels as charge carrier traps, surface and interface effects. Examples of related phenomenon in electronic and photonic devices. On the level of Compound Semiconductor Device Physics by S. Tiwari.

ELE E 536 VLSI Technology
Spring. 4 credits. 3 credits without laboratory with permission of instructor. Prerequisite: ELE E 457 or ELE E 453 or ELE E 539, or permission of instructor. Processing technology for very large scale integrated circuits for CMOS, BiCMOS, ECL, and related applications. Lithography, oxidation, diffusion, ion implantation, film deposition, wet and dry etching, multilevel metal interconnect, process integration, manufacturing costs, and integrated circuit reliability. Hands-on laboratory includes full MOS device and circuit fabrication process in a clean room; process simulation on CAD tools, and process, device, and circuit characterization.

ELE E 537 Computer System Packaging
Spring. 4 credits. 3 credits without project with permission of instructor. Prerequisites: ELE E 457 and ELE E 453 or ELE E 457 or ELE E 539; or permission of instructor. Integration of electronic systems from integrated circuits, to VLSI chips, modules, boards and full electronic systems including handheld, notebook, desktop, workstation, mainframe, and supercomputer class sizes. Packaging architectures, high-speed electrical and optical signal distribution, power distribution, thermal and thermal management, functional architecture, manufacturing, wireless functions measurement and simulation methods, and fundamental limits. State of the art case studies concentrate on the following electronic systems: personal digital assistants, PC cards, wireless communicators, compact handheld/laptop/computers, workstations, mainframes, and supercomputers. Computer simulations and designs on SPICE and AUDIT4.4 CAD tools. Demonstrations, measurements, and projects will be performed in the Advanced Electronic Packaging Facility (Kimball Hall). Computer System Packaging, a textbook manuscript in progress, and the textbook Principles of Electronic Packaging (D. P. Seraphim, R. Lasky, and C-Y Li, McGraw-Hill, 1989) will serve as the primary course texts. Lectures involve outside speakers from the electronics industry.

ELE E 554 Advanced VLSI Circuit Design

ELE E 558 Compound Semiconductor Electronics
Spring. 4 credits with lab. Prerequisites: ELE E 457 or equivalent. Electronic properties of advanced semiconductor materials and heterojunctions. Fundamentals of carrier transport and scattering. Properties of direct bandgap semiconductors and quantum wells. Advanced semiconductor devices including metal-semiconductor transistors (FETs), modulation-doped FETs, and heterojunction bipolar transistors (HBTs). High-frequency operation of compound semiconductor devices. Six two-week labs, which include low-temperature carrier transport, optical absorption and emission, and electrical characterization of compound semiconductor devices.

ELE E 633 Radiation Effects in Microelectronics
For description, see NS&E 621.

ELE E 636 Advanced Solid-State Devices
Spring. 4 credits. Prerequisites: ELE E 535 or ELE E 407 or equivalent. May not be offered 1995-96. Review of quantum foundations of carriers in semiconductors. Detailed discussion of non-equilibrium transport of carriers in semiconductors, including inversion layer, optical materials, scattering, relaxation, recombination, hot carrier effects, high field effects, and quantum mechanical tunneling. Exploration of semi-classical drift-and-diffusion, hydrodynamics, and Monte Carlo-based device simulation. Project requires independent simulation study of state-of-the-art semiconductor device.

Quantum and Opto-Electronics

ELE E 306 Fundamentals of Quantum and Solid-State Electronics
Spring. 4 credits. For description, see Core Courses.

ELE E 407 Quantum and Solid State Electronics II
Fall. Prerequisites: ELE E 306. Continuation of review of basic quantum mechanical and solid-state concepts. Quantum topics: harmonic oscillator, annihilation and creation operators, angular momentum, selection rules, LS coupling, Pauli principle, elements of perturbation theory, atom-radiation interaction; the quantum well, solid-state topics: thermal properties of crystals, Bose-Einstein distribution, Phonons Fermi-Dirac distribution, specific heat, metallic conductivity and related experiments, power conduction in metals; nearly-free-electron model; k-p expansion, plasma dispersion relation; plasmons; polaritons; excitons; Schottky barrier.

ELE E 430 Lasers and Optical Electronics
Fall. 4 credits with lab. Prerequisite: ELE E 306 or equivalent. An introduction to the operation of stimulated-emission devices such as lasers and devices based on linear and nonlinear optics. Material covered includes diffraction-limited optics, propagation of Gaussian laser beams, optical resonators, interaction of radiation with matter, physics of laser operation, laser design. Applications of coherent radiation to nonlinear optics, communication, and research will be discussed as time permits.

ELE E 530 Fiber and Integrated Optics
Fall. 4 credits. Prerequisite: ELE E 303 or equivalent. Physical principles of optical waveguides, optical sources and detectors, noise, modulators, and sensing. Wave equation solutions to the mode matching techniques of Gaussian laser beams, optical resonators, interaction of radiation with matter, including emission, absorption, scattering, and basic spectroscopic properties of key laser media; theory of the laser, including methods of achieving population inversions, dispersive effects, and laser oscillation spectrum.

ELE E 531 Quantum Electronics I
Fall. 4 credits. Prerequisites: ELE E 306 and 407, or Physics 443. A detailed treatment of the physical principles underlying lasers, related fields, and applications. Topics include the interaction of radiation and matter, including emission, absorption, scattering, and basic spectroscopic properties of key laser media; theory of the laser, including methods of achieving population inversions, dispersive effects, and laser oscillation spectrum.

ELE E 532 Quantum Electronics II
Spring. 4 credits. Prerequisite: ELE E 531 or permission of instructor. A continuation of ELE E 531. Topics include density matrix, nonlinear optical processes; propagation of nonlinear optical materials, overparametric oscillators, spontaneous and stimulated Raman and Brillouin processes; theory of coherence; pico- and femto-second
Plasmas, Space Engineering, and Remote Sensing

**ELE E 484 Introduction to Controlled Fusion: Principles and Technology (also M&AE 559 and NS&E 484)**

Spring. 3 credits. Prerequisites: ELE E 301 and 303, or permission of instructor. Intended for seniors and graduate students. For description, see NS&E 484.

**ELE E 486 Space Science and Engineering**

Spring. 3 credits. Prerequisites: ELE E 301 and ELE E 303 or equivalent. A survey of subjects relevant to spacecraft design. Astrodynamics and orbital maneuvers. Rigid-body dynamics and control. Communications. Black-body radiation and temperature control. Geospace environment. Remote sensing using electromagnetic techniques. Applications of these topics will be discussed where appropriate. At the level of Design of Geosynchronous Spacecraft, by Agrawal.

**ELE E 580 Applied Electrodynamics**

3 credits (4 credits with project). Prerequisite: ELE E 581 or ELE E 583 or permission of instructor. Not offered 1995-96. Contemporary electrodynamics with emphasis placed on applications. Theory, design, and use of high-power microwave devices, such as gyrotrons, CARMs, free-electron lasers, and traveling-wave tubes. Electromagnetic waveguide and cavity modes, charged-particle orbit theory, particle dynamics in electromagnetic fields, field transformations, electron beam generation, equilibria, waves on beams, low- and high-power microwave devices and their application. Project based on the numerical simulation of microwave devices.

**ELE E 581 Introduction to Plasma Physics**

Fall. 4 credits. Prerequisites: ELE E 303 and ELE E 304 or equivalent. First-year graduate-level course; open to exceptional seniors with permission of instructor. Plasma state; motion of charged particles in fields, drift-orbit theory; Coulomb scattering, collisions, ambipolar diffusion; elementary transport theory; two-fluid and hydromagnetic equations; plasma oscillations and waves, CMA diagram; hydromagnetic stability; elementary applications to space physics and controlled fusion.

**ELE E 582 Advanced Plasma Physics (also A&EP 607)**

Spring. 4 credits. Prerequisites: ELE E 581 or A&EP 606. Boltzmann and Vlasov Equations; dielectric tensor; waves in hot-magnetized plasma; Landau and cyclotron damping; microinstabilities; drift waves, low-frequency stability; test particles, Cerenkov emission; fluctuations; collisional effects; applications.

**ELE E 585 Atmospheric and Near Earth Space Science (also Astronomy 575)**


**ELE E 586 Solar Terrestrial Physics (also Astronomy 576)**

Spring. 3 credits. High-latitude ionosphere; electric fields in the polar cap and auroral zone; particle precipitation and the aurora; magnetic and ionospheric storms; plasma instabilities in the ionosphere and magnetosphere; structure and physical processes in the sun, solar corona, and solar wind; interactions between the solar wind and the earth's magnetosphere; trapping, acceleration, and drift of energetic particles in the magnetosphere.

**ELE E 587 Energy Seminar (also NS&E and M&AE 549)**

Fall and spring. 1 credit each semester. Master of Engineering (M.Eng) students in the Energy Option are expected to take this seminar both fall and spring for credit. 1 lec. D. Hammer. Energy resources, their conversion to electricity of process heat, and the environmental consequences of the energy cycle will be discussed by faculty members from several departments in the College of Engineering, other units within the university, and invited experts. Examples of topics to be surveyed are energy resources, economics, and politics; coal-based electricity generation; nuclear reactors; solar power; energy conservation by users; synthetic fuels; air-pollution control; nuclear-waste disposal; electric-power transmission systems; geothermal power, wind power, and advanced oil recovery.

**ELE E 682 Nonlinear Phenomena in Plasma Physics**

Fall. 3 credits. Prerequisite: ELE E 582. Offered every other year. Not offered 1995-96. Nonlinear models and behavior of plasmas. Solitons and nonlinear wave equations, resonant mode-mode coupling; ponderomotive effects and parametric processes, development of simplified plasma dynamical models.

**ELE E 685 Solar Plasma Physics**

Fall. 3 credits. Offered upon demand. Not offered 1995-96. This course will be coordinated with the two courses on upper atmospheric physics, ELE E 585 and 586, to provide an integrated view of solar-terrestrial physics for the graduate student intending a research career in space plasma physics. A thorough understanding of electromagnetic theory and some knowledge of fluid mechanics and plasma physics at the level of ELE E 581 and 582 are assumed.

**ELE E 687 Introduction to Antennas and Radar**

Fall. 3 credits. Prerequisites: ELE E 301 and ELE E 304 (or a grade of B or better in ELE E 303). Not offered fall 1995. Fundamentals of antenna theory, including gain and effective area, near and far fields, phased arrays, aperture antennas and aperture synthesis. Fundamentals of radar, including detection, tracking, Doppler shifts, sampling, range and frequency aliasing. Pulse compression principles and the ambiguity function; synthetic aperture radars and remote sensing from aircraft and satellites, over-the-horizon (OTH) radars and ionospheric propagation effects; radars and ionospheric propagation effects; radar astronomy techniques, including range-Doppler mapping of planets and the problem of overspread targets.

**ELE E 688 RF Circuits and Systems**

Spring. 3 credits. Prerequisites: ELE E 315 or equivalent. 2 design credits. Lab credit. Basic RF circuits and applications. Receivers, transmitters, modulators, filters, detectors, transmission lines, oscillators, frequency synthesizers, low-noise amplifiers. Applications include communication systems, radio and television broadcasting, radar, radio and radar astronomy. Computer-aided circuit analysis. Five laboratory sessions.

**ELE E 583 Electrodynamics**

Fall. 4 credits. Prerequisite: ELE E 301 and ELE E 304 or equivalent. 3 lecs. Maxwell's equations, vector fields, potentials, integral representations of the electromagnetic field, Green's functions. Special theory of relativity, Lienard-Wiechert potentials, radiation from accelerated charges, Cerenkov radiation. Electrodynamics of dispersive dielectric and magnetic media. At the level of Classical Electrodynamics, by Jackson.

**ELE E 584 Microwave Theory**

Spring. 4 credits. Prerequisites: ELE E 301 and 304 or equivalent. 3 lecs. 1 rec. Theory of passive microwave devices. Modal analysis of inhomogeneous waveguides and cavities. Waveguide excitation, perturbation theory. Nonreciprocal waveguide devices. Scattering matrix analysis of multiport junctions, resonant cavities, directional couplers, circulators. Periodic waveguides, coupled-mode theory.

**ELE E 588 Advanced Electromagnetic Wave Propagation and Scattering**

Spring. 3 credits. Prerequisite: ELE E 487 and 581 or permission of instructor. Offered alternate years. Not offered 1995-96. WK band and full-wave solutions of the wave equations, interactions between particles and waves, scattering of radio waves from random fluctuations in refractive index, scatter propagation, incoherent scatter from the ionosphere and its use as a diagnostic tool, scattering from unstable plasma waves, pulse compression and other radar probing techniques.

**General**

**ELE E 250 Technology in Western Society (also ENGRG 250)**

Fall. 3 credits. Approved for humanities distribution. For description, see Engineering Common Courses.

**ELE E 299 The Electrical and Electronic Revolutions (also ENGRG 292)**

Spring. 3 credits. Approved for humanities distribution. For description, see Engineering Common Courses.
ELE E 360  Ethical Issues in Engineering  
Spring. 3 credits. A social science elective for engineering students. Open to juniors and seniors. 
For description, see Engineering Common Courses.

ELE E 291-292  Electrical Engineering Project  
291, fall, 292, spring. 1–8 credits. Limited to sophomores in Engineering. 
Individual study, analysis, and, usually, experimental tests in connection with a special engineering problem chosen by the student after consultation with the faculty member directing the project. An engineering report on the project is required.

ELE E 291-392  Electrical Engineering Project  
391, fall, 392, spring. 1–8 credits. Limited to juniors in Engineering. 
Individual study, analysis, and, usually, experimental tests in connection with a special engineering problem chosen by the student after consultation with the faculty member directing the project. An engineering report on the project is required.

ELE E 391-392  Electrical Engineering Project  
491, fall, 492, spring. 1–8 credits. Limited to seniors in Engineering. 
Individual study, analysis, and, usually, experimental tests in connection with a special engineering problem chosen by the student after consultation with the faculty member directing the project. An engineering report on the project is required.

ELE E 493  MicroElectro Mechanical Systems (MEMS)  
Fall. 3 credits. Letter grade. Intended for seniors in Engineering or the physical sciences. 
Introductory course to the new, emerging technology of MEMS: microsensors, microactuators, and microrobots. Fundamentals of MEMS including materials, microstructures, devices and simple microelectromechanical systems. Fundamentals of scaling electronic and mechanical systems to the micrometer/mm-scale including semiconductor and thin film process constraints, material issues, micromechanical structures and the integration of micromechanical structures and actuators with simple electronics. This is an interdisciplinary course drawing content from mechanics, materials, structures, electronic systems, and the disciplines of physics and chemistry. Introductory, cross-disciplinary concepts are included in the course.

ELE E 495-496  Special Topics in Electrical Engineering  
1–4 credits. 
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 517-518  A Practical Electric Vehicle Motor Controller Utilizing Vector Control  
517, fall; 518, spring. Variable credits (3–8 per year). Prerequisites: ELE E 471, 472, 476, or 457. 
Design of a microcontroller-based vector-control system for a 3-phase induction motor. Emphasis is placed upon the coordinated design of a suitable feedback system with torque control, and a microprocessor arrangement capable of performing the coordinate rotations and implementing an overall torque feedback algorithm. Display and data acquisition software will be developed.

ELE E 591-599  Graduate Topics in Electrical Engineering  
1–4 credits. 
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 691-692  Electrical Engineering Colloquium  
691, fall; 692, spring. 1 credit each term. 
For students enrolled in the graduate Field of Electrical Engineering. Lectures by staff, graduate students, and visiting authorities. A weekly meeting for the presentation and discussion of important current topics in the field. Reports required.

ELE E 693-694  Master of Engineering Design  
693, fall; 694, spring. 1–10 credits. 
For students enrolled in the M.Eng.(Electrical) degree program. Uses real engineering situations to present fundamentals of engineering design. Each professor is assigned a section number. To register, see roster for appropriate numbers.

ELE E 695-699  Graduate Topics in Electrical Engineering  
1–6 credits. 
Seminar, reading course, or other special arrangement agreed on by the students and faculty members concerned.

ELE E 791-792  Thesis Research  
791, fall; 792, spring. 1–15 credits. 
For students enrolled in the master's or doctoral program.

GEOL 102  Evolution of the Earth and Life (also BIO S 170)  
Spring. 3 credits. GEOL 101 recommended. J. L. Cisne. 

GEOL 103  Introductory Environmental Geology  
Fall. 3 credits. A. L. Bloom, D. E. Karig. 
The geologic factors that affect human well being and safety, taught as much as possible with examples in Tompkins County. Weekly field trips to evaluate geologic hazards such as landslides, floods, groundwater pollution, and hazardous waste disposal. Later in the term, earthquakes and volcanic hazards will be reviewed.

GEOL 104  The Sea: An Introduction to Oceanography (also BIO ES 154)  
Spring. 3 credits. W. M. White, C. Green. 
A survey of the physics, chemistry, geology, and biology of the oceans for both science and non-science majors. Topics include: seabed spreading and plate tectonics, marine sedimentation, chemical and physical oceanography, ocean currents and circulation, the oceans and climate, ocean ecology, coastal processes, marine pollution and waste disposal, and marine resources.

GEOL 105  Writing on Rocks (Freshman Seminar)  
Fall. 3 credits. J. Chimient. 
See Freshman Seminar Handbook for description.

GEOL 106  Geology and Society  
Spring. 1 credit. May be taken concurrently with or after GEOL 101, 102, 103, 104, 111, 201, or 206. T. E. Jordan. 
Intended for students who are curious about the impact of geological materials and processes on society, what geologists actually do, what the big questions are in current research, and what a geology career might hold in store. A different speaker each week takes a look at topics ranging from environmental law to natural resources to agriculture.

GEOL 109  Dinosaurs  
Fall. 1 credit. J. L. Cisne. 
An entry-level survey course for those who are interested in dinosaurs and may lack a science background. Lectures examine the fossil evidence and illustrate how various geological and biological disciplines contribute to understanding dinosaurs and their world.

GEOL 111  To Know the Earth and Build a Habitable Planet  
Fall. 3 credits. J. M. Bird. 
Acquaints the non-science students with Earth. Major features and how Earth has evolved. Earth System Science and building a habitable planet. Effects of human activity on geologic environments, mitigating environmental damage, living with Earth's resources. Mineral resource use in 21st century and an environmentally sound fuel-minerals cycle.

GEOL 122  Earthquake! (also ENGR 122)  
Fall. 3 credits. L. Brown. 
The science of natural hazards and strategic resources is explored. Techniques for locating and characterizing earthquakes, and assessing the danger they cause; methods of using sound waves to image the earth's interior to search for strategic materials; the historical importance of such resources. Seismic
experiments on campus to probe for groundwater, the new critical environmental resource.

GEOL 123–124 Science of Earth Systems Colloquium (also SES 101–102 and SCAS 101–102)
For description, see the Science of Earth Systems section in “Interdisciplinary Centers, Programs, and Studies,” in the front part of the catalog.

GEOL 201 Introduction to the Physics and Chemistry of the Earth (also ENGRD 201)
Spring. 3 credits. Prerequisites: Mathematics 111 and Physics 112, L. M. Cathles.
For description, see Engineering Common Courses.

GEOL 203 Natural Hazards and the Science of Complexity
Fall. 3 credits. Prerequisites: 2 math courses, 1 physics course. D. L. Turcotte. Studies of natural hazards: earthquakes, floods, hurricanes, severe storms, wildfires, meteor impacts. Applications of the science of complexity to natural hazards: fractals, chaos, and self-organized criticality.

GEOL 204 Hydrology and the Environment (also SCAS 371 and ABEN 3711)
Introduction to hydrology: the hydrologic cycle and the role of water and chemicals in the natural environment. Includes precipitation, infiltration, evapotranspiration, groundwater, surface runoff, river meandering, floods, and droughts. Case studies, short field trips, computer programs, and laboratories foster an understanding of concepts and principles of hydrologic processes.

GEOL 206 Geologic Perspectives on Climate Change
Spring. 3 credits. K. Attoh.
Principles that govern the interactions among the principal components of the climate system (atmosphere, oceans, lithosphere, and solar radiation) are used to reconstruct Earth’s climates from the geologic record. Continental climate record is analyzed. Geological forcing/responses to climate change.

GEOL 210 Introduction to Field Methods in Geological Sciences
Fall. 3 credits. Prerequisite: GEOL 101, 103, 201, or permission of instructor.
Weekly field sessions. A weekend field trip S. Mahlung Kay, J. L. Gisne.
The methods by which geologists observe and interpret the surface expressions of geologic processes are studied. Field work is conducted in the Catskill and Appalachian regions. Field work requires extensive travel, good physical condition, and a commitment to understanding the science of geology.

GEOL 213 Marine and Coastal Geology
Summer. 2 credits. Prerequisites: an introductory course in geology or permission of instructor. Staff. A special one-week course offered at Cornell’s Sholes Marine Laboratory (SML), on an island near Portsmouth, New Hampshire. For more details and an application, consult the SML office, G14 Stimson Hall. Estimated cost for 1995 (including materials, room, board, and ferry transportation) is $895.

GEOL 214 Western Adirondack Field Course
Spring, one week at the end of the semester. 1 credit. Prerequisite: GEOL 210 or equivalent, or permission of instructor. Students should be prepared for overnight camping and share in the cost of camp meals. Independent project. W. A. Bassett.
Field mapping methods, mineral and rock identification, examination of Precambrian metamorphic rocks, and lower Paleozoic sediments, t alc and zine minerals.

Junior, Senior, and Graduate Courses
Of the following, the core courses GEOL 326, 355, 356, 375, and 388 may be taken by B.S. candidates who have successfully completed GEOL 201 or the equivalent and by B.A. candidates who have completed GEOL 101 or the equivalent, or who can demonstrate to the instructor that they have adequate preparation in mathematics, physics, chemistry, biology, or engineering.

GEOL 302 Evolution of the Earth System (also SES 332 and SCAS 3022)
For description, see the Science of Earth Systems section in “Interdisciplinary Centers, Programs, and Studies,” in the front part of the catalog.

GEOL 326 Structural Geology
Spring. 4 credits. Prerequisite: GEOL 101, 103, or 201, or permission of instructor. R. W. Allmendinger.
Nature and origin of deformed rocks at microscopic to macroscopic scales, with emphasis on structural geometry and kinematics. Topics include stress, strain, rheology, deformation mechanisms, minor structures, faulting, folding, and structural families.

GEOL 355 Mineralogy
Fall. 4 credits. Prerequisite: GEOL 101, 103, or 201 and Chem 207 or permission of instructor. W. A. Bassett.
Examination of minerals by hand-specimen properties and optical microscopy. Geologic setting, classification, crystal structures, phase relations, chemical properties, and physical properties of minerals. X-ray diffraction is introduced. Independent research project.

GEOL 356 Petrology and Geochemistry
Spring. 4 credits. Prerequisite: GEOL 355. R. W. Kay.
Principles of phase equilibrium as applied to igneous and metamorphic systems. Description, classification, chemistry, origin, regional distribution, and dating of igneous and metamorphic rocks. Geochemical distribution of trace elements and isotopes in igneous and metamorphic systems. The petrological evolution of the planets.

GEOL 375 Sedimentology and Stratigraphy
Fall. 4 credits. Prerequisite: GEOL 101, 103, or 201. J. L. Cisner, T. F. Jordan.

GEOL 388 Geophysics and Geotectonics
Spring. 4 credits. Prerequisites: Mathematics 192 and Physics 208, 213, or equivalent. B. L. Isacks.
Global tectonics and the deep structure of the solid earth as revealed by investigations of earthquakes, earthquake waves, the earth’s gravitational and magnetic fields, and heat flow.

GEOL 411 Global Change Research: Mountains, Climate, and Erosion
Fall. 3 credits. B. L. Isacks.
Undergraduate participation in one of the interdisciplinary research projects of the Earth Observing System (EOS). Choice of topics concerning the interplay of climate, topography, and the environment of the Andes and Himalayan mountains as revealed by satellite images and other computerized data analyzed with modern image processing and Geographic Information Systems (GIS).

GEOL 423 Petroleum Geology
Fall. 3 credits. Recommended: GEOL 326. Offered alternate years. W. B. Travers.
Introduction to hydrocarbon exploration and development. Exploration techniques, including well logs, fluid pressures, seismic-reflection methods, gravity, and magnetic measurements to map subsurface structures and stratigraphy. Petroleum origin and migration. Dispersal systems and depositional patterns of petroleum reservoirs. Economics of exploration, leasing, drilling, and production. Estimates of petroleum reserves, including tar sands and oil shales.

GEOL 425 Precambrian Orogenic Cycles
Fall. 3 credits. Prerequisites: GEOL 326, GEOL 356, or permission of instructor. Offered alternate years. Not offered in 1995–96. K. Attoh.
Thermal and kinematic histories of Precambrian orogenic belts. Recent data from metamorphic, structural, and geochronological studies to infer deformation paths in selected orogens, including Dahomeyide and Eburnian orogens of West Africa, and Grenville, Penokean, and Kenoran orogens of the Canadian Shield. Current hypotheses regarding Precambrian orogenic styles and continental crust evolution.

GEOL 426 Geologic Evolution of South America
Spring. 3 credits. Prerequisites: GEOL 326 and GEOL 356, or permission of instructor. Not offered 1995–96. S. Mahlung Kay.
Regional overview of Paleozoic to recent tectonic and magmatic evolution of South America in the framework of crustal and mantle evolution, with particular emphasis on the evolution of the region of the modern Andean Cordillera.
GEOL 436 Environmental Geophysics  
Spring. 3 credits. Offered alternate years.  
Prerequisites: PHYS 213 and MATH 192 or equivalents, or permission of instructor.  
L. Brown.  
Theory of geophysical techniques for imaging the subsurface. Gravity, magnetic, electrical, and radar methods are covered, but emphasis is on seismic reflection and refraction. The focus is on shallow targets of environmental or archaeological interest. Field experience with these methods is offered in a companion course, GEOL 457.

GEOL 437 Geophysical Field Methods  
Fall. 3 credits. Offered alternate years.  
Prerequisites PHYS 213 and MATH 192 or equivalents, or permission of instructor.  
L. Brown.  
Introduction to field methods of geophysical exploration, especially as applied to environmental issues. Emphasis on seismic, gravity, magnetic, and electric techniques. Field surveys carried out at the beginning of the semester are analyzed in a series of weekly follow-up meetings during the semester wherein the results are analyzed and interpreted. A field companion to GEOL 436, which is recommended but not required prior to this course.

GEOL 438 Reflection Seismology II: Analysis and Interpretation  
Spring. 3 credits. Offered alternate years; not offered 1995-96.  
L. Brown.  
Methods of inferring geologic structures from seismic images. Migration, velocity, and amplitude interpretation. Seismic stratigraphy, 3D, VSP, and shear wave interpretation. Interactive seismic modeling.

GEOL 439 Reflection Seismology I: Acquisition and Processing  
Fall. 3 credits. Offered alternate years; not offered 1995-96.  
L. Brown.  
Design of seismic surveys, both 2D and 3D. Source characteristics, array design, recording geometries and equipment. Land and marine operations. Basis signal processing theory. Applied 2D interactive seismic processing with ProMAX:FK filtering, deconvolution, velocity analysis, stacking, migration (time and depth), display.

GEOL 441 Geomorphology  
Fall. 3 credits. Prerequisite: GEOL 101, 103, or 201, or permission of instructor.  
A. L. Bloom.  
Systematic analysis of landforms constructed by tectonic and volcanic processes and their subsequent progressive destruction by climate-controlled erosional processes.

GEOL 442 Glacial and Quaternary Geology  
Spring. 3 credits. Prerequisite: GEOL 441 or permission of instructor.  
A. L. Bloom.  
Glacial processes and deposits and the chronology of the Quaternary Period.

GEOL 445 Geohydrology (also ABEN 471)  
Fall. 3 credits. Prerequisites: Mathematics 294 and Engr 202.  
Intermediate level study of aquifer geology, groundwater flow, and related design factors. Includes description and properties of natural aquifers, groundwater hydraulics, soil water, and solute transport.

GEOL 452 X-ray Diffraction Techniques  
Spring. 3 credits. Prerequisites: GEOL 355 or permission of instructor. Offered alternate years.  
A. L. Bloom and staff.  
Automated X-ray diffractometer, Debye-Scherrer, real-time Laue, high-temperature diffraction, high-pressure diffraction, and pole-figure analysis. Applications in materials science and geological sciences. Labs will be held in the new Materials Science X-Ray Facility.

GEOL 453 Advanced Petrology  
Fall. 3 credits. Prerequisite: GEOL 356.  
Offered alternate years; not offered 1995-96.  
R. W. Kay.  
Magma and metamorphism in the context of plate tectonics. Emphasis on element chemistry and phase petrology as monitors of the creation and modification of igneous rocks. Temperature and stress in the crust and mantle and their influence on reaction rates and textures of metamorphic rocks. Application of experimental studies to natural systems.

GEOL 454 Advanced Mineralogy  
Spring. 3 credits. Prerequisite: GEOL 355 or permission of instructor. Offered alternate years.  
W. A. Bassett.  
Crystallography and crystal chemistry of minerals and the methods of their study. X-ray diffraction, optical methods, computer simulation of crystal structures. Emphasis on effects of high pressures and temperatures with implications for understanding of Earth's interior.

GEOL 455 Geochemistry  
Fall. 4 credits. Prerequisites: Chemistry 207 and Mathematics 192 or equivalent.  
Recommended: GEOL 356. Offered alternate years.  
W. M. White.  
The Earth from a chemical perspective. Formation of the elements; cosmochemistry; chemical evidence regarding the formation of the Earth and Solar System; trace-element geochemistry; isotope geochemistry; geochemical thermodynamics and kinetics; chemical kinetics, crust, mantle, and core; weathering and the chemical nature of natural waters; chemistry of rivers and the oceans; hydrothermal systems and ore deposition.

GEOL 457 Metamorphic Petrology  
Fall. 3 credits. Prerequisite: GEOL 355.  
Offered alternate years.  
K. Attoh.  
Theoretical, field, and experimental basis for understanding of metamorphic processes and rocks. Relations between crustal dynamics and metamorphic processes.

GEOL 458 Volcanology  
Spring. 3 credits. Corequisite: GEOL 356 or equivalent. Offered alternate years.  
W. M. White.  

GEOL 476 Sedimentary Basins: Tectonics and Mechanics  
Spring. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years.  
T. E. Jordan.  
Subsidence of sedimentary basins from the point of view of plate tectonics and geomechanics. Interactions of subsidence, sediment supply, and environmental characteristics in development of stratigraphic sequences. Stratigraphic characteristics of active-margin, passive-margin, and cratonic basins. Geophysical and stratigraphic modeling; sequence stratigraphy. Modern and ancient examples.

GEOL 478 Advanced Stratigraphy  
Spring. 3 credit. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years.  
T. E. Jordan.  
Modern improvements on traditional methods of study of ages and of genetic relationships among sedimentary rocks, emphasizing 3-D relationships. Techniques and applications of sequence stratigraphy at scales ranging from beds to entire basins. Physical correlation, dating techniques, and time resolution in sedimentary rocks. Physical controls on the stratigraphic record and numerical modeling.

GEOL 479 Paleobiology (also BIO ES 479)  
Fall. 3 credits. Prerequisites: BIO G 101-102 and 103-104 or equivalent, and either GEOL 375, BIO ES 274, BIO ES 373, or permission of instructor.  
Offered alternate years.  
J. L. Cisne and staff.  
The major groups of organisms and their evolutionary histories. Intended to fill out the biological backgrounds of geology students and the geological backgrounds of biology students concerning the nature and significance of the fossil record.

GEOL 481 Senior Survey of Earth Systems  
Fall. 3 credits. Limited to seniors majoring in geological sciences.  
J. M. Bird.  
Survey course that integrates undergraduate course work, intended to enhance overall understanding of geological sciences. Emphasis on current models of earth's dynamic systems (e.g., global climate change, mantle evolution). Guest lecturers; synthesis and review literature; scientific literature readings; discussions; student presentations.

GEOL 490 Honors Thesis (B.A. degree candidates)  
Fall, spring. 2 credits. Staff.  
Thesis proposal to be discussed with director of undergraduate studies during the junior year. Participation requires acceptance of a thesis proposal by the faculty committee.

GEOL 491-492 Undergraduate Research  
Fall, spring. 1 or 2 credits. Staff. (B. L. Isacks and A. L. Bloom, coordinators).  
Introduction to the techniques and philosophy of research in the earth sciences and an opportunity for undergraduates to participate in current staff research projects. Topics chosen in consultation with, and guided by, a staff member. A short written report is required, and outstanding projects are prepared for publication.

GEOL 500 Design Project in Geohydrology  
Fall. spring 3-12 credits. An alternative to an industrial project for M.Eng. students choosing the geohydrology option. May continue over two or more semesters.  
L. M. Cathles.  
The project may address one of many aspects of groundwater flow and contamination, and
must involve a significant geological component and lead to concrete recommendations or conclusions of an engineering nature. Results are presented orally and in a professional report.

**GEOL 502 Case Histories in Groundwater Analysis**
Spring. 4 credits. L. M. Cathles. Groundwater flow in a specific area, such as a proposed nuclear-waste disposal site, analyzed in depth. Geological and resource data on the area are presented early in the course. Then the material is analyzed by students working in an engineering analysis team. Each student makes a weekly progress report and writes part of a final report. Results are presented in a half-day seminar at end of term.

**GEOL 622 Advanced Structural Geology I**
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years. R. W. Allmendinger and D. E. Karig. Stress-strain theory and application. Advanced techniques of structural analysis. Topics include finite and incremental strain measurement; microstructure, preferred orientation, and TEM analysis; pressure solution and cleavage development; and experimental deformation. Applications to deformation of unconsolidated sediments, brittle and brittle-ductile deformation of supracrustal strata, and ductile deformation of high-grade metamorphic rocks. Kinematic analysis of shear zones and folds in these regimes.

**[GEOL 624 Advanced Structural Geology II**
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years. Not offered 1995-96.

**GEOL 628 Geology of Orogenic Belts**
Spring. 3 credits. Prerequisite: permission of instructor. J. M. Bird. A seminar course in which students study specific geologic topics of an orogenic belt selected for study during the term. The course is intended to complement GEOL 681.

**[GEOL 635 Advanced Geophysics I: Fractals and Chaos in Geology and Geophysics**
Fall. 3 credits. Prerequisite: GEOL 380 or permission of instructor. Not offered 1995-96. D. L. Turcotte. Definitions of fractal sets and statistical fractals, scale invariance, self-affine fractals, multifractals, applications to fragmentation, seismicity and tectonics, petroleum distribution and reserves, ore grade and tonnage, drainage networks and landforms, and floods and droughts. Definitions of chaos and self-organized criticality, renormalization groups, diffusion limited aggregation and percolation clusters, wavelet transforms, applications to mantle convection, the earth's dynamo, and distributed seismicity.]

**GEOL 636 Advanced Geophysics II: Quantitative Geodynamics**
Spring. 3 credits. Prerequisite: GEOL 380 or permission of instructor. D. L. Turcotte. Stress and strain in the earth, elasticity and flexure, heat transfer, gravity, fluid mechanics, rock rheology, faulting, chemical geodynamics, flow in porous media.

**GEOL 651 Analysis of Biogeochemical Systems**
Fall. 3 credits. Prerequisite: MATH 293 or permission of instructor. L. A. Derry. Dynamics of biogeochemical systems. Kinetic treatment of biogeochemical cycles. Box models, residence time, response time. Analytical and numerical solutions of model systems. Eigen-analysis of linear systems. Feedback and nonlinear cases, problems of uncertainties in natural systems. Modeling software such as Stella II and Matlab; applications to current research of participants or from recent literature.

**GEOL 656 Isotope Geochemistry**
Spring. 3 credits. Open to undergraduates. Prerequisite: GEOL 455 or permission of instructor. Offered alternate years. W. M. White. Nucleosynthetic processes and the isotopic abundances of the elements. Geochronology and cosmochemistry using radioactive decay schemes, including U-Pb, Rb-Sr, Sm-Nd, K-Ar, U-series isotopes, and cosmogenic isotopes such as 3He and 4He. Use of radiogenic and stable isotopes in geology and their application to study of the evolution of the crust and mantle. Isotopic evidence regarding the formation of the Earth and the Solar System. Stable isotopes and their use in geothermometry, ore petrogenesis, paleontology, and the global climate system.

**GEOL 661 Geotectonics**
Fall. 3 credits. Prerequisite: permission of instructor. J. M. Bird. Theories of orogeny, ocean and continent evolution. Kinematics of lithospheric plates. Rock-time assemblages of modern oceans and continental margins, and analogs in ancient orogenic belts. Time-space reconstructions of specific regions. Problems of dynamic mechanisms—corollaries and evidence from crustal features.

**GEOL 685 Computer Methods in Geological Sciences**
Fall, spring. 3 credits. L. Brown, B. L. Isacks. Independent research projects using state-of-the-art computational resources in the Department of Geological Sciences. Possibilities include: image and seismic processing, seismic and geomechanical modeling, GIS, use of interpretational workstations for 3D seismic and satellite imagery, modeling fluid flow through complex media.

**GEOL 700-799 Seminars and Special Work**
Fall, spring. 1–3 credits. Prerequisite: permission of instructor. Staff. Advanced work on original investigations in geological sciences. Topics change from term to term. Contact appropriate professor for more information.

**GEOL 722 Advanced Topics in Structural Geology**
R. W. Allmendinger.

**GEOL 725 Rock and Sediment Deformation**
D. E. Karig.

**GEOL 731 Plate Tectonics and Geology**
J. M. Bird.

**GEOL 733 Fractal Chaos—Independent Studies**
D. L. Turcotte.

**GEOL 741 Advanced Geomorphology**
Topics A. L. Bloom.

**GEOL 751 Petrology and Geochemistry**
S. Mahlburg Kay, R. Kay.

**GEOL 753 Advanced Topics in Mineral Physics**
W. A. Bassett.

**GEOL 755 Advanced Topics in Petrology and Tectonics**
J. Bird, W. A. Bassett.

**GEOL 774 Current Research in Petrology**
S. Mahlburg Kay, R. Kay.

**GEOL 776 Advanced Topics in Petroleum Exploration**
W. Travers.

**GEOL 777 Advanced Topics in Sedimentology and Stratigraphy**
T. E. Jordan.

**GEOL 778 Paleobiology**
J. L. Case.

**GEOL 780 Seismic Record Reading**
M. Barazangi.

**GEOL 781 Geophysics, Exploration Seismology**
L. Brown.

**GEOL 783 Advanced Topics in Geophysics**
B. L. Isacks.

**GEOL 789 Lithospheric Seismology (COCORP Seminar)**
L. Brown.

**GEOL 793 Andes-Himalaya Seminar**

**GEOL 796 Geochemistry of the Solid Earth**
W. M. White.

**GEOL 797 Fluid-Rock Interactions**
L. M. Cathles.

**GEOL 799 Soil, Water, and Geology Seminar**
L. M. Cathles, T. S. Steenhuis.

**MATERIALS SCIENCE AND ENGINEERING 199**

**MS&E 111 Materials by Design (also ENGRI 118)**
Spring. 3 credits. E. P. Giannelis. Portable CD Player (also ENGRI 118) For description, see Engineering Common Courses.

**MS&E 118 Design Integration: A Portable CD Player (also ENGRI 118)**
Spring. 3 credits. M. O. Thompson, W. Sachse. For description, see Engineering Common Courses.
MS&E 261 Introduction to Mechanical Properties of Materials (also ENGRD 261)
Fall. 3 credits. S. L. Sass.
For description, see Engineering Common Courses.

MS&E 262 Introduction to Electrical Properties of Materials (also ENGRD 262)
Fall. 3 credits. Prerequisite: co-registration in Physics 213 or electricity and magnetism in high school physics. M. O. Thompson.
For description, see Engineering Common Courses.

MS&E 277 The Substance of Civilization—Materials through the Ages
Spring. 3 credits. 2 lecs, 1 lab. S. L. Sass.
Materials have enabled revolutionary advances in how we live, work, fight, travel, and play; hence the naming of eras after them—Stone, Bronze, and Iron Ages. This course explores the role of materials in the development of the modern Western industrial civilization by putting technology into a historical context and examining the advances made possible by innovations with materials, starting with the Stone Age. Interconnections between critical developments are identified and explored—for example, the relationship between materials, agriculture, and written languages in the fourth millennium B.C., and between the Exodus of the Hebrews, the general tumult in the Eastern Mediterranean, and the onset of the Iron Age, at the end of the second millennium B.C. Early technologies will be illustrated with beautiful works of art. Lectures, demonstrations, and hands-on laboratory experiments, will elucidate the origin of the unique properties of materials such as polymers, ceramics, metals and glass. This course is designed to fulfill the science requirement in the College of Arts and Sciences.

MS&E 285 Art, Archaeology, and Analysis (also ENGR 185 and NS&E 285)
Spring. 3 credits.
For description, see Engineering Common Courses.

MS&E 331/531 Structure of Materials
Fall. 4 credits. J. M. Blakely.

MS&E 332/532 Electrical and Magnetic Materials
Spring. 3 credits. Prerequisite: MS&E 331 or permission of instructor. J. M. Blakely.

MS&E 333 Research Involvement I
Fall. 3 credits. Prerequisite: approval of course coordinator. Staff.
Supervised independent research project in association with a faculty member and faculty research group of the department. Students design experiments, set up the necessary equipment, and evaluate the results. Creativity and synthesis are emphasized.

MS&E 334 Research Involvement II
Spring. 3 credits. Prerequisite: approval of department. Staff.
See MS&E 333 for description. May be a continuation of MS&E 333 or a one-term affiliation with a research group.

MS&E 335/535 Thermodynamics of Condensed Systems
Fall. 4 credits. Prerequisite: Math 293 and 294. E. J. Kramer.
The three laws of thermodynamics are introduced as a basis for understanding phase equilibria, heterogeneous reactions, solutions, electrochemical processes, surfaces, and defects. Statistical mechanics is introduced and applied to the calculation of entropy and specific heat of solids. Examples of design and control of processes.

MS&E 336/536 Kinetics, Diffusion, and Phase Transformations
Spring. 3 credits. Prerequisite: MS&E 335 or permission of instructor. Staff.
Introduction to absolute rate theory, atomic motion, and diffusion. Applications and design involving nucleation and growth of new phases in vapors, liquids, and solids; solidification, crystal growth, oxidation and corrosion, radiation damage, recrystallization, gas-metal reactions, and thermomechanical processing to produce desired microstructures and properties. One-third of course involves examples of design and control of processes.

MS&E 414/514 Chemical Processing of Ceramics
Spring. 3 credits. E. P. Giannelis.

MS&E 435 Senior Thesis I & II
Fall and spring. 2-semester course. 8 credits. T. C. Green.
Open to advanced undergraduates in lieu of the senior materials laboratory. Proposals for thesis topics should be approved by the supervising faculty member prior to beginning the senior year. Approved thesis topics will normally involve original experimental research in direct collaboration with an ongoing research program. Periodic oral and written presentations and a final written thesis are required.

MS&E 441/541 Microprocessing of Materials
Fall. 3 credits. D. G. Ast.
Materials and processing steps involved in the production of integrated circuits and other micro-devices. Science, engineering, and design of processes to produce a specific device, such as a DRAM or CMOS inverter (not detailed electrical-circuit analysis of these devices or system design). Emphasis is on silicon, with extensions to gallium arsenide. All fabrication steps are considered, from single crystal growth and wafer production, to characterization, testing and yield calculations. Major topics are thermal oxidation of silicon, chemical vapor deposition of thin films, diffusion, ion implantation, resist and the principles of lithography using UV, electrons and X-rays, and wet/dry etching.

MS&E 442/542 Macroprocessing
Spring. 3 credits. Emphasis on deformation and macro-processing of materials; sheet metals forming, superplastic forming, casting, single crystal growth, powder sintering metal/ceramic joining, surface treatments. Course based on case studies demonstrating various macro-processing techniques. Course includes comprehensive experimental project involving design, measurement, and analysis of superplastic forming process starting from basic mechanisms. Results compared with the predictions of numerical analysis.

MS&E 443-444 Senior Materials Laboratory
443, fall; 444, spring. 3 credits each term. D. T. Grubb.
Practical laboratory covering the analysis and characterization of materials and processing. Emphasis on design of experiments for evaluation of materials’ properties and performance as related to processing history and microstructure. Projects available in areas such as plasticity, mechanical and chemical processing, phase transformations, electrical properties, magnetic properties, and electron microscopy.

MS&E 445 Mechanical Properties of Materials
Fall. 3 credits. Prerequisites: MS&E 331 and 336, or permission of instructor. R. Raj.
Stress, strain, and the basics of concepts in deformation and fracture for metals, polymers, and ceramics. Analysis of important mechanical properties such as plastic flow, creep, fatigue, fracture toughness, and fatigue. Application of these principles to the design of improved materials and engineering structures.

MS&E 447/448 Materials Design Concepts I & II
447, fall; 448, spring. 2 credits each term. C. K. Ober.
Defines design in the field of materials science using Dieter’s Engineering Design, Ashby’s Materials Selection in Engineering Design, and other sources. Innovation, patent searching, and ASTM standards. Speakers from industry and other institutions lecture on causes and solutions of design problems. Students give short oral and written presentations. Proposal for design-study project in the fall semester. Completion of extensive design-study project in the spring semester. Study includes prior art literature, materials selection, and some modeling, as well as discussion of broader economic, regulatory, environmental, and liability concerns that may arise.

MS&E 449 Introduction to Ceramics
Fall. 3 credits. Prerequisite: MS&E 331 or permission of instructor. R. Dieckmann.
Ceramic processes and products, crystal structures, structure of glasses, point defects (point-defect chemistry and relation to
This course is a fundamental approach to thin-growth of epitaxial layers, formation of film science that will cover deposition of films, conductor heterostructures, will be contrasted for epitaxial growth, such as used in semicon-ductor physics, and quantum wells, and interdiffusion and metals, ceramics, and polymers.

Principles of thin films, characterization of thin films on substrates and surfaces, and ultra-thin films. The course will begin with the design and growth of thin films. The course will begin with the design and growth of thin films.

[MSE 518 Introduction to Electron Microscopy Fall. 3 credits. Prerequisite: MSE 518. Limited to 12 students. A fee will be charged for instrument usage. Offered alternate years. Not offered 1995-96. D. T. Grubb. Students will be instructed in the proper use of a scanning and a transmission electron microscope. All stages from initial alignment of the instrument to presentation of the results will be covered. Three or four projects will be completed, including obtaining atomic lattice fringe images and X-ray microanalysis.]

[MSE 553-554 Special Project 553, fall; 554, spring. 6 credits each term. Master of Engineering research project.

Graduate Core Courses


MSE 602 Elasticity, Plastic Flow, and Fractures Fall. 3 credits. Staff. Micromechanical modeling of mechanical behavior. A materials-science approach to modeling combines concepts from continuum mechanics, thermodynamics, kinetics and atomic structure. Topics include: elastic properties of crystals, deformation mechanisms from ambient temperature to very high temperatures over a wide range of strain rates, fracture in brittle materials, fracture in ductile materials, fracture at elevated temperatures, crack tip phenomena, and composite materials.

Further Graduate Courses

MSE 610 Principles of Diffraction (also A&EP 711) Spring. 4 credits. Lab. M. O. Thompson. Survey of atomic and structural analysis techniques as applied to surface and bulk materials. Physical processes involved in the interaction of ions, electrons, and photons with solids; characteristics of the emergent radiation in relation to the structure and composition. Techniques covered include Auger electron spectroscopy, ion scattering, nuclear activation, secondary ion mass spectroscopy, UV and X-ray photoelectron spectroscopies, X-ray diffraction and related techniques, etc. Selection and design of experiments for near-surface analysis.

MSE 603 Analytical Techniques for Materials Science Spring. 3 credits. Staff. Phenomenology and microscopic aspects of diffusion in fluids, both simple and polymeric, and in solids, metallic and ceramic. Phase stability and transformation; nucleation and grain growth, spinodal decomposition and displacive transformations. Phase coarsening processes, recrystallization and grain growth. Diffusion-controlled growth, crystal structure, and growth, moving-boundary problems. Grain-boundary migration controlled kinetics. At the level of Diffusion in the Condensed State, by Kirkaldy and Young.

MSE 604 Diffusion and Phase Transformations: Kinetics in Condensed Matter Spring. 3 credits. Staff. This course focuses on the link between the local chemistry of the elements comprising a solid, the structure of the solid, and the bonding in the solid. Elementary aspects of group theory and representation theory, introductory quantum mechanics including Schrödinger equation for approaches to bonding in extended systems, hydrogen atom and diatomic molecules; band structures and densities of states of simple crystals. Crystal structures. Structure of and bonding in surfaces, amorphous materials, glasses, liquids, interfaces as well as case studies.

Related Course in Another Department

Introductory Solid-State Physics (Physics 454)

Graduate-Level Professional Courses

[MSE 516 Thin-Film Materials Science Fall. 3 credits. Offered alternate years. Not offered 1995-96. D. G. Ast. This course is an approach to thin-film science that will cover deposition of films, growth of epitaxial layers, formation of multilayered structures such as superlattices and quantum wells, and interdiffusion and reaction in the course. The course will begin with structure and thermodynamics of surfaces and ultrathin films. The conditions for epitaxial growth, such as used in semiconductor heterostructures, will be contrasted with those for amorphous or polycrystalline films. The role of thermal processing for reactive thin films involving the formation of surface oxides, metallic silicides, and aluminides will be presented.]
MS&E 612 Solid-State Reactions
Spring. 3 credits. Offered alternate year. R. Dieckmann.
Point defects (thermal disorder, component-activity-dependent disorder, influence of dopants, different kinds of associates), Coulomb interaction between point defects), dislocations, grain boundaries transport in solids (definition and different types of diffusion, effective diffusion coefficients, reference frames, mechanisms of electrical conduction), elementary diffusion mechanisms, atomic theory of transport, correlation effects, phenomenological theory of transport including some aspects of thermodynamics of irreversible processes, Fick's laws, point-defect relaxation (migration controlled, phase-boundary-reaction controlled), interdiffusion, solid-state reactions involving compound formation (oxidation of metals, reactions between solids), demixing of materials in potential gradients, selected solid-state processes (internal reactions, etc.).

MS&E 614 Advanced Transmission Electron Microscopy

MS&E 615 Advanced Mechanical Properties
Fall or spring. 3 credits. Offered on demand. Not offered 1995–96. Staff. Advanced experimental and theoretical aspects of the deformation and failure of structural materials. Although the emphasis is on metals and alloys, attention is also given to glasses, ceramics, semiconductors, and polymeric materials. Topics include theory and practice of mechanical testing, deformation behavior of polymeric single-crystal metals and coherently bonded semiconductors, phenomenological theories of deformation, the mechanical equation of states for metals, application to the thermal fatigue problem, micromechanical theories of plastic flow in metals, creep in metals, and the time-dependent deformation of polymers, relationship of microstructure to mechanical properties of metals and polymers, ductile fracture of metals, brittle fracture of metals and ceramics.

MS&E 616 Electronic and Magnetic Materials

MS&E 617 Solid State Electrochemistry
Spring. 3 credits. Prerequisite: MS&E 612 or permission of instructor. Offered alternate years. Not offered 1995–96. R. Dieckmann. Disorder in solids; thermodynamic quantities or quasi-free electrons and electron defects in semiconductors; mobility, diffusion and partial conductivity of ions and electrons; solid ionic conductors; solid electrolytes and solid solution electrodics; galvanic cells with solid electrolytes for thermodynamic investigations; technical applications of solid electrolytes. At the level of Electrochemistry of Solids by H. Ricker.

MS&E 618 Laser Processing of Materials
Fall or spring. 3 credits. Offered on demand. Not offered 1995–96. M. O. Thompson. Use of high-intensity lasers in the processing of materials to achieve unique microstructures and metastable phases. Topics: fundamentals of the interaction of E&M fields with metals, semiconductors and ceramics, transfer of energy between electronic and phonon systems, kinetics of rapid solidification, metastable phase transformations, microstructure of rapidly solidified materials, and current industrial applications.

MS&E 619 Superhard Materials
Fall. 3 credits. Prerequisite: permission of instructor. A. L. Ruoff. The superhard materials include diamond, cubic boron nitride (possibly the new C3N), and boron carbide, B4C. The origin of their extreme hardness is examined. The thermodynamics of their stability and the kinetics of their crystal growth will be described. Commercial methods of synthesis of large crystals, powders, thin films and polycrystalline aggregates (by sintering at pressure) will be examined. Their chemical, optical and mechanical properties will be studied. Moreover, there is substantial potential for radiation-hard semi-conducting devices and the status of this area will be covered. At the level of Field, The Properties of Natural and Synthetic Diamond, plus recent papers.

MS&E 524/624 Synthesis of Polymeric Materials
Spring. 3 credits. Alternate years. Prerequisite: MS&E 552 or permission of instructor. C. K. Ober. Preparation of synthetic polymers by step- and chain-growth polymerization: condensation; free radical, anionic, and cationic mechanisms; ring opening and coordination routes. Statistical and kinetic aspects of homopolymer and copolymer formation. Stereoechemistry of polymers and spectroscopic methods for polymer analysis. Molecular aspects of polymer design for properties such as conductivity, elasticity, thermal stability, and engineering properties. Special topics will include liquid crystalline polymers, photoreists, and supermolecular chemistry. At the level of Principles of Polymerization, by Odian.

Specialty Courses

MS&E 707 Solar Energy Materials
3 credits. Offered on demand. Not offered 1995–96. D. G. Ast. Photovoltaic energy conversion: (1) theory (on the level of Howl); (2) the role of crystal defects and grain boundaries on the conversion efficiency, and schemes to passivate these defects; (3) current investigations in the DOE program to produce large quantities of solar-grade semiconducting Si; (4) theory and materials for amorphous silicon solar cells.

MS&E 716 Transition Metal Oxides (also Chem 716)
Fall. 3 credits. Offered on demand. For description see Chem 716.

MS&E 779 Special Studies in Materials Science
Fall. Variable credit. Offered on demand. Staff. Supervised studies of special topics in materials science.

MS&E 798 Materials Science and Engineering Colloquium
Fall, spring. 1 credit each term. Credit limited to graduate students. Staff. Lectures by visiting scientists, Cornell staff members, and graduate students on subjects of interest in materials sciences, especially in connection with new research.

MS&E 799 Materials Science Research Seminars
Fall, spring. 2 credits each term. For graduate students involved in research projects. Staff. Short presentations on research in progress by students and staff.

MS&E 800/801 Research in Materials Science
800: Fall, spring. Credit to be arranged. Staff. Independent research in materials science under the guidance of a member of the staff.

MECHANICAL AND AEROSPACE ENGINEERING

General and Required Courses

M&E 101 Naval Ship Systems
For description, see NAV S 202.

M&E 102 Drawing and Engineering Design (also ENGRG 102)
Fall, spring. 1 credit. Half-term course offered twice each semester. Enrollment limited to thirty students each half term. Recommended for students without previous mechanical drawing experience. S-U grades optional. For description, see Engineering Common Courses.

M&E 117 Introduction to Mechanical Engineering (also ENGRH 117)
Spring. 3 credits. For description, see Engineering Common Courses.

M&E 212 Mechanical Properties and Processing of Engineering Materials
Spring. 4 credits. Prerequisite: ENGRD 202. Introduction to the broad range of mechanical behavior of materials and their processing. The mechanical properties of metals, ceramics, and composite materials are covered together with their microstructural features and processing. Ideal work methods are introduced for the analysis of bulk deformation processes. Heat treatment of metals and alloys, phase diagrams, casting and quenching processes.
MECHANICAL AND AEROSPACE ENGINEERING

M&AE 221 Thermodynamics (also ENGRD 221)
Fall, spring, may be offered summer. 3 credits. Prerequisites: Mathematics 192 and Physics 112. Lab fee.
For description, see Engineering Common Courses.

M&AE 225 Mechanical Design and Synthesis
Spring. 3 credits. Prerequisite: ENGRD 202. Lab fee.
A hands-on laboratory, the use of machine tools, mechanical dissection, and a number of design projects provide direct experience of creative design synthesis.

M&AE 323 Introductory Fluid Mechanics
Fall, usually offered in Engineering Cooperative Program. 4 credits. Prerequisites: Engr 202 and 203 and coregistration in 221, or permission of instructor. Statics, kinematics, potential flow, dynamics, momentum, and energy relations. Thermodynamics of compressible flow; dimensional analysis, real fluid phenomena, laminar and turbulent motion, boundary layer, lift and drag; supersonic flow and shock waves.

M&AE 324 Heat Transfer
Spring, may be offered in Engineering Cooperative Program. 3 credits. Prerequisite: M&AE 323 or permission of instructor. Conduction of heat in steady and unsteady situations. Surfaces with fins and systems with heat sources. Forced and natural convection of heat arising from flow around bodies and through ducts. Heat exchangers. Emission and absorption of radiation; radiative transfer between surfaces. Introduction to boiling and phase change.

M&AE 325 Mechanical Design and Analysis
Fall, usually offered in Engineering Cooperative Program. 4 credits. Prerequisites: Engr 202 and 203. Lab fee. Application of the principles of mechanics and materials to problems of analysis and design of mechanical components and systems.

M&AE 326 System Dynamics
Spring; may be offered in Engineering Cooperative Program. 4 credits. Prerequisite: Mathematics 294, Engr 203. Junior standing required. Dynamic behavior of mechanical systems: modeling, analysis techniques, and applications; vibrations of single- and multi-degree-of-freedom systems; feedback control systems, stability analysis. Computer simulation and experimental studies of vibration and control systems.

M&AE 427 Fluids/Heat Transfer Laboratory
Fall. 3 credits. Prerequisites: M&AE 323, 324. Fulfills the writing requirement. Laboratory exercises in methods, techniques, and instrumentation used in fluid mechanics and heat transfer. Measurements of temperature, heat transfer, viscosity, drag, fluid-flow rate, effects of turbulence, air foil stall, two-phase flows and engine performance. Biweekly written assignments.

M&AE 428 Engineering Design
Fall. 2 credits. Prerequisite: completion of six semesters in mechanical engineering or equivalent. A comprehensive look at principles of design with a focus on case studies. Examples taken from fluid, thermal, and energy areas, as well as mechanical systems and the manufacturing area of mechanical engineering. Special emphasis on the design sources of engineering failures in products, machines, and mechanical systems, as well as how design should relate to a successful manufactured product.

M&AE Systems, Design, Materials Processing, and Precision Engineering

M&AE 386 Automotive Engineering
Spring. 3 credits. Prerequisite: M&AE 325 or permission of instructor. Selected topics in the analysis and design of vehicle components and vehicle systems. Emphasis on automobiles, trucks, and related vehicles. Power plant, drive line, brakes, aerodynamics, suspension, and structure. Other types of vehicles may be considered.

M&AE 389 Computer-Aided Design
Fall. 3 credits. Limited to juniors and seniors. May be offered in Engineering Cooperative Program. Prerequisite: A course in programming. May be taken either before or in conjunction with a numerical-methods course. Fulfills computer applications requirement. A first course in CAD, introducing the use of software and computer methods in mechanical engineering. Topics include simulation, optimization, solution of field equations (finite elements, finite differences), least-square function approximation, geometry (space curves, splines, patches), computer graphics, and data visualization.

M&AE 412 Metal Forming, Machining and Solidification Processes
Fall. 4 credits. Prerequisite: M&AE 212 or M&AE 261. Analysis and design of extrusion, drawing, forging and rolling processes using slab analysis techniques. Sheet forming and anisotropy; Machining processes. The mechanics of chip formation. Cutting forces and stresses, shear angle theories, velocity diagrams, heat generation and optimum selection of cutting process parameters. Basic solidification processes. Solution of heat conduction/solute diffusion driven solidification problems for metals and alloys.

M&AE 414 Introduction to Precision Engineering
Fall. 3 credits or 4 with laboratory. Prerequisites: ENGRG 102 and M&AE 212, or 412, or permission of instructor. Variability in mechanical products arises primarily from the processes used to make and assemble parts; it must be accommodated in design and controlled in manufacturing. This course addresses form variability through studies of ideal-form modeling, form tolerancing, form measurement, and manufacturing process modeling (sources of form error). Central principles, practices, and limitations are summarized.

M&AE 417 Introduction to Robotics

M&AE 425 Design: Beyond the Imaginary
Fall. 4 credits. Prerequisite: M&AE 325 or permission of instructor. Lab fee $50.
Fulfills senior design requirement. Not offered 1995-96. Serves as a mechanical engineering field elective. Requires a comprehensive technical report on the design project and fulfills the field design requirement. Students will form teams to design, analyze, and create a prototype of a new mechanism. The experience of creative synthesis is of primary importance; analytic skills will play a critical role in both conception and final design specification. This course aims to develop an appreciation for the balanced interplay between the synthetic analytic, and "just build it and see" processes. Student teams will present their work and analysis of techniques of special relevance to their design; e.g., dynamic simulation and kinematic analysis of CAD packages. Ecclectic design topics include human-powered vehicles, robot submarines, technology appropriate for non-industrialized nations and projects for local industry.

M&AE 461 Engineering for Entrepreneurs
Spring. 3 credits. Intent is to provide students with the tools and skills necessary to identify, evaluate, and undertake new business ventures. A major course project will be the development of a business plan for an innovative new venture and will require the detailing of manufacturing, support, and information systems as well as staffing and cost data. Intended for juniors and seniors in the College of Engineering, this course is open to all undergraduates.

M&AE 464 Design for Manufacture
Fall. 3 credits. Prerequisites: M&AE 212 and 428 and senior standing. Enrollment limited. Fulfills field design requirement. Principles and methodologies for conceptual design, elimination procedures for selecting design alternatives, emphasis on design for manufacturability, quality, and cost considerations; team design projects from concept, analysis, and computer-aided drafting to manufacturing methods.

M&AE 465 Biomechanical Systems—Analysis and Design
Spring. 3 credits. Prerequisites: Engr 202 and 203. Enrollment limited. 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 engineering and rehabilitation engineering.

M&AE 469 Stress Analysis for Mechanical and Aerospace Design
Fall. 3 credits. Prerequisite: T&MAM 202 and M&AE 325 or permission of instructor. Study of advanced topics in the analysis of stress and deformation of elastic bodies, with applications to the analysis and design of mechanical and aerospace systems and components. Review of fundamentals and application to classical problems. Introduction to modern computational methods (e.g., finite element) for analysis of stress and deformation.

M&AE 478 Feedback Control Systems
For description, see ELE E 471.
engineers. Processes intended for non-mechanical
Casting, forming, material removal and joining
metals, polymers, ceramics and composites.

For description, see T&AM 555.

M&AE 389. Spring. 4 credits. Lab fee $25. Prerequi­
tions: graduate standing, or permission of
instructor. Intended for students in
computer application requirement. Not
offered 1995-96. 

M&AE 478, ELE E 471, graduate standing, or
permission of instructor. Not offered
1995-96.

Further development of the theory, design,
and implementation of feedback control systems
with particular emphasis on applications,
modeling and system identification, and
hardware implementation. Digital control is
introduced. Labs include real-time micropro­
cessor-based control of a D.C.-motor
positioning system, a two-link robot arm, and
a two-tank level control system.

[M&AE 479] Mechanical Engineering
Design
Spring. 4 credits. Lab fee $25. Prerequi­
sites: graduate standing or permission of
instructor. Intended for students in
M.Eng.(Mechanical) program. Fulfills
M.Eng. (M.E.) design requirement. Not
offered 1995-96. 

M&AE 458 Automotive Engineering Design
Spring. 4 credits. Prerequisite: M&AE 428
and senior standing. Fulfills field design
requirements. Slab-analysis models and
bound theorems for problems of forging,
extrusion, and rolling. Analysis of sheet-metal forming including limit diagrams and
springback. Defect initiation during forming
processes. Basic solidification processes.

Morphological instability of a solid/liquid interface, solidification microstructures, solute
redistribution, microsegregation and
macrosegregation. Thermomechanical defects in casting processes. Rapid solidification
microstructures. Behavior and forming of
metal alloys in the semi-solid state.

M&AE 613 Computational Methods in Materials Processing
Spring. 4 credits. Prerequisite: M&AE 612 or
permission of instructor.

Thermodynamic framework for inelastic
constitutive models, temperature and rate
dependence, phenomenology of plastic
def ormation. The finite-element method for
rigid plastic flow analysis of extrusion,
drawing, forging, rolling and plate bending.
Integration of viscoplastic models, geometry
updating, boundary conditions, friction at
tool/workpiece interface, modeling of
incompressibility, iterative process, and
applications to process design. Comparison
of the flow formulation/finite element
analysis. Analysis of hot forming processes.

Procedures for heat-transfer analysis. Preform
design. Modeling of plastic anisotropy with
applications to sheet forming. Modeling of
heat flow and deformation on casting
processes.

[M&AE 614] Precision Engineering
Fall. 4 credits. Prerequisite: graduate
standing or permission of instructor. Not
offered 1995-96.

This is a graduate version of M&AE 414. The
themes are ideal-form modeling, form
tolerancing, form measurement, and manufac­
turing process modeling (sources of form
error). Relevant theory is developed, current
practices are summarized, and current
research issues are examined. Research in the
area is expanding rapidly, because some
variation control is a central tool in continuous
quality improvement.

M&AE 615 Experiments in Materials Processing
Fall. 4 credits. Prerequisite: graduate
standing or permission of instructor.

This course will focus on experiments related
to the mechanical properties and
experiments using various materials process­
ing apparatus and will include a general
introduction to sensors and instrumentation
for engineering measurements. Testing for
mechanical properties/model parameter
characterization: inelastic deformation,
fatigue, and fracture, including rate and
temperature effects. Process simulation
experiments including forging, extrusion,
rolling, and ironing. Formability experiments.

Determination of heat transfer coefficients
associated with quenching and solidification
process. Fluidity measurements. Specimen
design and fabrication. Although the focus is
on metals and alloys attention is also given to
polymers and ceramic materials.

M&AE 625 Product Development
Fall or spring. 4 credits. Prerequisite:
graduate standing.

Covers a wide range of methods and
techniques used in the product development
process. Concepts and methods of design, team
organization, conceptual design, parametric
design, concurrent engineering, quality
function deployment, and Taguchi method.

M&AE 655 Advanced Composite Materials and Structures (also T&AM 655)
For course description, see T&AM 655.

[M&AE 665] Advanced Topics in Orthopaedic Biomechanics
On demand. 4 credits. Prerequisites:
graduate standing, or permission of
registration in advanced courses in
static and dynamic conditions, compact
and trabecular bone and structural materials,
structural analysis of bone-implant systems,
remodeling of bone.

M&AE 670 Finite Element Analysis for Mechanical and Aerospace Design
Spring, 4 credits. Prerequisite: graduate
standing, or permission of instructor.

Introduction to the finite-element method for
static and dynamic analysis of mechanical and
aerospace structures (and related nonstructural
applications such as heat conduction).
Primary emphasis on underlying mechanics
and numerical methods. Secondary considera­
tion of inherent capabilities and limitations
of large-scale, general-purpose structural
mechanics programs. Introduction to
computational aspects through development
of small, special-purpose programs and
application of available general-purpose
programs. Term project.

[M&AE 678] Optimal Control and Estimation
Fall, on demand. 3 credits. Prerequisite:
M&AE 478, ELE E 471, graduate standing,
or permission of instructor; programming
ability in FORTRAN, Pascal, or C.
Corequisite: ELE E 521. Not offered
1995-96.

Develops the theory of the design of modern
multi-input-multi-output feedback control
systems using optimal control techniques.
Topics covered include trajectory optimization
and the minimum principle, bang-bang
optimal control solutions, Kalman filtering,
LQR/LQE compensator design, suboptimal
control and estimation, and applications to
regulator and tracking problems. Both linear
and nonlinear systems, and continuous-time
and discrete-time control, and considered.

M&AE 679 Modeling and Simulation of Dynamic Systems
Spring. 4 credits. Prerequisite: graduate
standing or permission of instructor.

Practice tools with selected applications from
diverse fields. Representation of continuous
dynamic systems by state-variable models.
Simulation by numerical integration using
procedural languages (such as FORTRAN
and Pascal) and digital simulation packages
(such as CSMP and STELLA). Special topics in linear
and nonlinear dynamics. Term project.

[M&AE 682] Hydrodynamic Lubrication: Fluid-Film Bearings
4 credits. Prerequisite: graduate standing
or permission of instructor. Not offered
1995-96. Course offering depends upon
faculty availability.

Theory of hydrodynamic lubrication and its
application to the analysis and design of fluid­
film bearings and other devices. General
topics include viscous flow in thin films,
self-acting and externally pressurized bearings
with liquid and gas lubricant films, bearing-system dynamics, and computational methods. Selected special topics such as elastohydrodynamic lubrication and artificial joints. Term project.]

[M&AE 685 Optimum Design of Mechanical Systems
On demand. 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered 1995–96. Course offering depends upon faculty availability. The formulation of design problems frequently encountered in mechanical systems as optimization problems. Theory and application of methods of mathematical programming for the solution of optimum design problems.]

[M&AE 715 Finite-Deformation Plasticity and Rheology and Their Applications in Materials Processing

Energy, Fluids, and Aerospace Engineering

[M&AE 305 Introduction to Aeronautics
Fall. 3 credits. Limited to upperclass engineers, others with permission of instructor. Introduction to the concept of aircraft design. Principles of incompressible and compressible aerodynamics, boundary layers, and wing theory. Description and performance of propulsion-driven and jet propulsion engines. Design studies focus on transonic passenger airplanes and small supersonic jets.]

[M&AE 400 Components and Systems: Engineering in a Social Context (also Physics 481 and Science, Technology, and Society 400)
Spring. 3 credits. Prerequisite: upperclass standing, two years of college physics. Serves as an approved elective but not as a field elective in mechanical engineering. Offered alternate years. Not offered 1995–96. This course addresses, at a technical level, broader questions than are normally posed in the traditional engineering or physics curriculum. Through the study of individual cases such as the Strategic Defense Initiative (SDI), the National Aerospace Plane, and nuclear power and its alternatives, we investigate interactions between the scientific, technical, political, economic, and social forces that are involved in the development of engineering systems.]
M&AE 601 Foundations of Fluid Dynamics and Aerodynamics
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. Foundations of fluid mechanics from an advanced viewpoint. Aspects of kinetic theory as it applies to the formulation of continuum fluid dynamics. Surface phenomena and boundary conditions at interfaces. Fundamental kinematic descriptions of fluid flow, tensor analysis, derivation of the Navier-Stokes equations and energy equation for compressible fluids. Viscous flows, boundary layers, potential flows, vorticity dynamics.

M&AE 602 Fluid Dynamics at High Reynolds Numbers
Spring. 4 credits. Prerequisite: M&AE 601. Navier-Stokes and Euler equations, integral formulas for fluid forces and moments on immersed bodies in compressible and incompressible viscous flows. Vorticity dynamics in incompressible flows, Kelvin's theorem. Fjortoft's theorem, Helmholtz decomposition of vector fields. Singularities, vortex filaments, vortex sheets, Biot-Savart relations. Irrotational motion: representations in terms of velocity or vector potentials. Topology of flows; general results in potential theory.

M&AE 608 Physics of Fluids
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Behavior of a gas is considered at the microscopic level. Introduction to kinetic theory; velocity distribution, collisions, Boltzmann equation. Quantum theory: internal structure, rigid rotator, harmonic oscillator, one-electron atom. Statistical mechanics: partition functions, relation to thermodynamics. These ideas are combined through application to modeling finite rate changes in the vibrational energy and chemical composition of high-temperature air.

M&AE 651 Advanced Heat Transfer
Spring. 4 credits. Prerequisite: graduate standing or permission of instructor. Advanced treatment of conduction and convection heat transfer. Basic equations reasoned in detail. Integral and differential formulations. Exact and approximate solutions. Forced convection. Natural convection. Laminar and turbulent flows. Effects of viscous dissipation and mass transfer.

M&AE 654 Radiation Heat Transfer

M&AE 732 Analysis of Turbulent Flows
Spring. 4 credits. Prerequisite: M&AE 601 or permission of instructor. Offered alternate years. Study of methods for calculating the properties of turbulent flows. Characteristics of turbulent flows. Direct numerical simulations, large-eddy simulations, and the closure problem: Reynolds-stress equation: effects of dissipation, anisotropy, deformation. Transported scalars. Probability density functions (pdf's) and correlations, and properties, transport equations, relationship to second-order closures, stochastic modeling, Langevin equation, and Monte Carlo solutions. The course emphasizes comparison of theory with experiment.

M&A 733 Stability of Fluid Flow

M&AE 734 Turbulence and Turbulent Flow
Fall. 4 credits. Prerequisite: M&AE 601, graduate standing, or permission of instructor. Topics include the dynamics of buoyancy and shear-driven turbulence, boundary-free and bounded shear flows, second-order modeling, the statistical description of turbulence, turbulent transport, and spectral dynamics.

M&AE 736 Computational Aerodynamics
Spring. 4 credits. Prerequisites: graduate standing, an advanced course in continuum mechanics or fluid mechanics, and some FORTRAN programming experience. Numerical methods to solve inviscid and high Reynolds-number fluid-dynamics problems, including finite-difference, finite-volume, and spectral methods. Accuracy, convergence, and stability; treatment of boundary conditions and grid generation. Focus on hyperbolic (unsteady flow with shock waves) and mixed hyperbolic-elliptic (steady transonic flow) problems. Assignments require programming digital computer.

M&AE 737 Computational Fluid Mechanics and Heat Transfer

M&A 490 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Limited to undergraduate and graduate students. Prerequisite: permission of instructor. Intended for an individual student or a small group of students who want to pursue a particular analytical or experimental investigation outside of regular courses or for informal instruction supplementing that given in regular courses.

M&AE 491 Design Projects in Mechanical and Aerospace Engineering
Fall, spring. Credits to be arranged. Prerequisite or corequisite: M&AE 428. Fulfills field design requirement. Intended for individual students or small groups of students who want to pursue particular design projects outside of regular courses.

M&AE 545 Energy Seminar
For description, see NS&E 545.

M&AE 592 Seminar and Design Project in Aerospace Engineering
Fall, spring. 2 credits each term. Prerequisite: graduate standing or permission of instructor. Intended for students in M.Eng (Aerospace) program.

M&AE 791 Mechanical and Aerospace Engineering Colloquium
Fall, spring. 1 credit each term. S-U grades only. For graduate students involved in research projects.

M&AE 799 Mechanical and Aerospace Engineering Research Conference
Fall, spring. 1 credit each term. Credit limited to graduate students. All students and staff invited to attend.

M&AE 890 Research in Mechanical and Aerospace Engineering
Credit to be arranged. Prerequisite: candidacy for M.S. degree in mechanical or aerospace engineering or approval of director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.

Special Offerings

M&A 890 Special Investigations in Mechanical and Aerospace Engineering
Fall, spring. Credit to be arranged. Limited to undergraduate and graduate students. Prerequisite: permission of instructor. Intended for an individual student or a small group of students who want to pursue a particular analytical or experimental investigation outside of regular courses or for informal instruction supplementing that given in regular courses.

M&AE 491 Design Projects in Mechanical and Aerospace Engineering
Fall, spring. Credits to be arranged. Prerequisite or corequisite: M&AE 428. Fulfills field design requirement. Intended for individual students or small groups of students who want to pursue particular design projects outside of regular courses.

M&AE 545 Energy Seminar
For description, see NS&E 545.

M&AE 592 Seminar and Design Project in Aerospace Engineering
Fall, spring. 2 credits each term. Prerequisite: graduate standing or permission of instructor. Intended for students in M.Eng (Aerospace) program.

M&AE 791 Mechanical and Aerospace Engineering Colloquium
Fall, spring. 1 credit each term. S-U grades only. For graduate students involved in research projects.

M&AE 799 Mechanical and Aerospace Engineering Research Conference
Fall, spring. 1 credit each term. Credit limited to graduate students. All students and staff invited to attend.

M&AE 890 Research in Mechanical and Aerospace Engineering
Credit to be arranged. Prerequisite: candidacy for M.S. degree in mechanical or aerospace engineering or approval of director. Independent research in an area of mechanical and aerospace engineering under the guidance of a member of the faculty.
NUCLEAR SCIENCE AND ENGINEERING

A number of courses in nuclear science and engineering are offered through the School of Applied and Engineering Physics (see A&EP 609, 612, 633, 634, 636, 638, and 651).

NS&E 121 Fission, Fusion, and Radiation (also ENGRI 121)
Spring. 3 credits. This is a course in the Introduction to Engineering series. For description, see Engineering Common Courses.

NS&E 285 Art, Archaeology, and Analysis
For description, see ENGRI 185.

NS&E 303 Introduction to Nuclear Science and Engineering I (also A&EP 303)
Fall. 3 credits. Prerequisite: Physics 214 or Mathematics 294. This course is designed for juniors or seniors from any engineering field who want to prepare for graduate-level nuclear science and engineering courses at Cornell or elsewhere. It can also serve as a basic course for those who do not intend to continue in the field. Introduction to the fundamentals of nuclear reactors. Topics include an overview of the field of nuclear engineering; nuclear structure, radioactivity, and reactions; interaction of radiation and matter; and neutron moderation, neutron diffusion, the steady-state chain reaction, and reactor kinetics. At the level of Introduction to Nuclear Engineering, by Lamarch.

NS&E 404 Introduction to Controlled Fusion: Principles and Technology (also ELE E 484, M&AE 459, and A&EP 484)
Spring. 3 credits. Prerequisites: PHYS 112, 213, and 214, or equivalent background in electricity and magnetism and mechanics; and permission of instructor. Intended for seniors and graduate students. Introduction to the physical principles and various engineering aspects underlying power generation by controlled fusion. Topics include: (i) fuels and conditions required for fusion power, and basic fusion-reactor concepts; (ii) fundamental aspects of plasma physics relevant to the confinement of thermonuclear plasmas, and basic engineering problems for a fusion reactor; and (iii) an engineering analysis of the present engineering design for the large, international, next-step tokamak experiment, ITER (International Toroidal Experimental Reactor), which is to be a fusion-power test reactor, and/or analysis of inertial confinement fusion-reactor designs. Parts (i) and (ii) will be treated in lectures; part (iii) will include talks by course participants.

NS&E 509 Nuclear Physics for Applications
Fall. 3 credits. Prerequisites: sophomore physics and math, or permission of instructor; some upper-division physics is desirable. Primarily for graduate students, especially those with a major or minor in Nuclear Science and Engineering; also open to qualified undergraduates. A first course in nuclear physics. Systematic presentation of nuclear phenomena and processes that underlie applications ranging from nuclear power (fission and fusion), to nuclear astrophysics, to nuclear analytical methods for research in non-nuclear fields. Radioactivity, nuclear reactions, and interaction of radiation with matter. At the level of Radiochemistry and Nuclear Methods of Analysis, by Ehmann and Vance or Nuclear and Radiochemistry, by Friedlander, et al.

NS&E 545 Energy Seminar (also M&AE 507)
Fall and spring. 1 credit each semester. May be taken both fall and spring for credit. Master of Engineering (M.Eng.) students in the Energy Option are expected to take this seminar both fall and spring for credit. Energy resources, their conversion to electricity or process heat, and the environmental consequences of the energy cycle will be discussed by faculty members from several departments in the College of Engineering, other units within the university, and invited experts. Examples of topics to be surveyed are energy resources, economics, and politics; coal-based electricity generation; nuclear reactors, solar power, energy conservation by users; synthetic fuels; air-pollution control; nuclear waste disposal; electric-power transmission systems; geothermal power; wind power; and advanced oil recovery.

NS&E 551 Nuclear Methods in Non-Nuclear Research Fields
Spring. 3 credits. Prerequisite: Physics 214 or 218, or permission of instructor; some upper-division physics desirable. Primarily for graduate students in archaeology, geology, chemistry, biology, materials science, and other non-nuclear fields in which nuclear methods are used. Open to qualified undergraduates. A more intensive related course, A&EP 651, is intended for nuclear specialists. Lectures on interaction of radiation with matter, radiation protection, and nuclear instruments and methods including data reduction. About ten experiments are available on radiation detection, attenuation, and measurement, electronic instrumentation, including computerized systems; activation analysis; and emerging applications such as prompt gamma analysis and neutron radiography. The TRIGA reactor is used. Emphasis is on some nuclear methods, particularly instrumental ones using neutrons, that are used in, or are being adapted for, non-nuclear fields, but tracer and other chemical techniques are not included. Students can expect seven or eight experiments to meet their interests and needs. At the level of Radiochemistry and Nuclear Methods of Analysis, by Ehmann and Vance or Nuclear and Radiochemistry, by Friedlander, et al.

NS&E 590 Independent Study
Fall, spring. 1–4 credits. Grade option letter or S-U. Independent study or project under guidance of a faculty member.

NS&E 591 Project
Fall, spring. 1–6 credits. Master of Engineering or other project under guidance of a faculty member.

NS&E 621 Radiation Effects in Microelectronics (also ELE E 633)
Fall. 3 credits. Prerequisite: Permission of instructor. A seminar intended for seniors and graduate students in engineering or applied physics. An introduction to the physical processes that underlie the malfunction of microelectronic circuitry resulting from exposure to ionizing radiation. Basic device-failure mechanisms, including total-dose effects, single-event upsets, and latchup, as well as the roles that circuit testing and modeling methods play in improving circuit design. Impact of surface radiation typical of low-energy electron and photon sources on device fabrication. Reference materials from the current literature.

OPERATIONS RESEARCH AND INDUSTRIAL ENGINEERING

OR&IE 115 Engineering Application of Operations Research (also ENGRI 115)
Fall, spring. 3 credits. Enrollment not open to OR&IE upperclass majors. For description see Engineering Common Courses.

OR&IE 270 Basic Engineering Probability and Statistics (also ENGRD 270)
Fall, spring, summer. 3 credits. Prerequisite: first-year calculus. For description see Engineering Common Courses.

OR&IE 310 Industrial Systems Analysis
Spring. 4 credits. Prerequisite or corequisite: ENGR 270. 3 lecs. 1 computing session. Design of production facilities, including engineering economy, taxation effects, materials handling process design, and facility layout. Operations analysis, including process scheduling, process evaluation, procedural analysis, project management, methods analysis and design, work measurement, inventory control, job evaluation, and quality engineering and control. Formerly listed as OR&IE 410.

OR&IE 320 Optimization I
Fall. 4 credits. Prerequisite: Mathematics 221 or 294. Formulation of linear programming problems and solution by the simplex method. Related topics such as sensitivity analysis, duality, and network programming. Applications include such models as resource allocation and production planning.

OR&IE 321 Optimization II
Spring. 4 credits. Prerequisite: OR&IE 320 or equivalent. 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.
I provides a rigorous foundation in theory. This second course in probability and statistics focuses on hypothesis testing, confidence intervals, and test and estimate parameters for these models. Probabilistic ideas are combined with the methods for modeling, analyzing, and controlling randomness in engineering problems. Probabilistic ideas are used to construct models for engineering problems, and statistical methods are used to test and estimate parameters for these models. Special topics include random variables, probability distributions, density functions, expectation and variance, multidimensional random variables, and important distributions including normal, Poisson, exponential, hypergeometric, confidence intervals, and point estimation using maximum likelihood and the method of moments.

**OR&IE 361 Introductory Engineering Stochastic Processes I**

Spring. 4 credits. Prerequisite: OR&IE 260 or OR&IE 360 or equivalent. Basic concepts and techniques of random processes are used to construct models for a variety of problems of practical interest. Topics include the Poisson process, Markov chains, renewal theory, models for queuing and reliability.

**OR&IE 416 Design of Manufacturing Systems**

Fall. 4 credits. Senior OR&IE students only. Others by permission of instructor only. Project course in which students, working in teams, design a manufacturing logistics system and conduct capacity, material flow, and cost analysis of their design. Meetings between project teams and faculty advisers are substituted for some lectures. Analytical methods for controlling inventories, planning production, and evaluating system performance will be presented in lectures. Lab fee $15.

**OR&IE 417 Material Handling Systems**

Fall. 4 credits. Design of the layout of processes and storage areas and the material-handling system for movement of items. Typical equipment used. Material flow analysis. The functions of identification control, storage, movement, batching, merging, and dispersion.

**OR&IE 431 Discrete Models**

Spring. 4 credits. Prerequisites: OR&IE 320 and COM S 211, or permission of instructor. Basic concepts of graphs, networks, and discrete optimization. Fundamental models and applications, and algorithmic techniques for their analysis. Specific optimization models studied include flows in networks, the traveling salesman problem, and network design.

**OR&IE 432 Nonlinear Optimization**

Spring. 4 credits. Prerequisite: OR&IE 320. Introduction to the practical and theoretical aspects of nonlinear optimization. Attention given to the computational efficiency of algorithms and the application of nonlinear techniques to linear programming; e.g., interior-point methods. Methods of numerical linear algebra introduced as needed.

**OR&IE 435 Introduction to Game Theory**

Fall. 3 credits. A broad survey of the mathematical theory of games, including such topics as two-person matrix and bimatrix games, cooperative and noncooperative n-person games, games in extensive, normal, and characteristic function form. Economic market games. Applications to weighted voting and cost allocation.

**OR&IE 451 Economic Analysis of Engineering Systems**

Spring. 4 credits. Prerequisites: OR&IE 320 and OR&IE 350. Financial planning, including cash-flow analysis and inventory flow models. Engineering economic analysis, including discounted cash flows and taxation effects. Application of optimization techniques, as in equipment replacement or capacity expansion models. Issues in designing manufacturing systems. Student group project.

**OR&IE 462 Introductory Engineering Stochastic Processes II**

Spring. 4 credits. Prerequisite: OR&IE 361 or equivalent. 3 lecs, 1 rec. Stationary processes, martingales, random walks, and gambler’s ruin problems, processes with stationary independent increments. Brownian motion and other cases, branching processes, renewal and Markov-renewal processes, reliability theory, Markov decision processes, optimal stopping, statistical inference from stochastic models, and stochastic comparison methods for probability models. Applications to population growth, spread of epidemics, and other models.

**OR&IE 475 Regression**

Fall. Second half of term. 2 credits. Prerequisite: ENGRD 270. Linear models; estimation and testing, confidence sets; diagnostics and residual analysis, variable selection and modeling.

**OR&IE 476 Experimental Design I**


**OR&IE 480 Information Technology**

Spring. 4 credits. 3 lecs, 1 rec. The objective of this course is to introduce students to information technologies. Topics include Communications Systems, Computer Architectures, Database Management Systems, and Developmental Methodologies found in Manufacturing Engineering, Product Documentation, Management, Forecasting and Marketing, Order Entry, Production Planning and Control, Distribution, Finance, Trading, and Transportation. Lectures and laboratory experiences will be used.

**OR&IE 499 OR&IE Project**

Fall, spring. Credit to be arranged. Prerequisite: permission of instructor. Project-type work, under faculty supervision, on a real problem existing in some firm or institution, usually a regional organization. Opportunities in the course may be discussed with the associate director.

**OR&IE 515 Design of Manufacturing Systems**

Fall. 4 credits. Prerequisite: permission of instructor. Limited to M.Eng. students in OR&IE. For description, see OR&IE 416. Lab fee $15.

**OR&IE 516 Case Studies**

Fall. 1 credit. Limited to M.Eng. students in OR&IE. Students are presented with unstructured problems that resemble real-world situations. They work in project groups to formulate mathematical models, perform computer analyses of the data and models, and present oral and written reports.

**OR&IE 520 Operations Research I: Optimization I**

Fall. For description, see OR&IE 320.

**OR&IE 521 Optimization II**

Fall. For description, see OR&IE 321.

**OR&IE 523 Operations Research II: Introduction to Stochastic Modeling**

For description, see OR&IE 361.

**OR&IE 525 Production Planning and Scheduling Theory and Practice**

Spring. 3 credits. Prerequisite: OR&IE 320. Production planning, including MRP, linear programming, and related concepts. Scheduling and sequencing work in manufacturing systems. Job release strategies and control of work in process inventories. Focus on setup time as a determinant of plans and schedules.

**OR&IE 528-529 Selected Topics in Applied Operations Research**

Fall, spring. Credit to be arranged. Prerequisite: permission of instructor. Current topics dealing with applications of operations research.

**OR&IE 551 Economic Analysis of Engineering Systems**

Spring. 4 credits. Prerequisites: OR&IE 320 and OR&IE 350. Lectures concurrent with OR&IE 451. For description see OR&IE 451.

**OR&IE 560 Engineering Probability and Statistics II**

For description, see OR&IE 360.

**OR&IE 561 Queuing Theory and Its Applications**


**OR&IE 562 Inventory Theory**

Spring. 4 credits. Prerequisite: OR&IE 321, 361 or permission of instructor. Discussion of the nature of inventory systems and their design and control. Periodic and continuous review policies for single-item and single-location problems. Multi-item and
multi-echelon extensions. Dynamic and static models are discussed. Distribution problems are analyzed. Applications are stressed.

**OR&IE 563 Applied Time-Series Analysis**

The first part of this course treats regression methods to model seasonal and non-seasonal data. After that, 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. Analysis of real data is carried out. Assignments require computer work with a time-series package.

**OR&IE 564 Introductory Engineering Analysis**
Spring. 4 credits. Prerequisite: OR&IE 361 or equivalent. Lectures concurrent with OR&IE 360. 1 recs.

For description, see OR&IE 462.

**OR&IE 565 Applied Financial Engineering**
Spring. 4 credits. 3 lecs.

This course has two components: a sequence of lectures and a project. The course will be co-listed with the Johnson School. In addition, the student will be taught by the faculty member from each school. The lectures will be given by the faculty for the course and invited speakers from the financial industry. The project will satisfy the M.Eng. project requirement.

**OR&IE 575 Experimental Design II**


**OR&IE 577 Quality Control**
Fall. 3 credits. Prerequisites: ENGRD 270. 3 lecs.


**OR&IE 580 Design and Analysis of Simulated Systems**
Fall. 4 credits. Prerequisites: programming experience and OR&IE 360/560, or permission of instructor. Note: OR&IE 360/560 may be taken concurrently. Digital computer programs to simulate the operation of complex discrete systems in time. Modeling, program organization, pseudo-random variable generation, simulation languages, statistical considerations; application to a variety of problem areas.

**OR&IE 589 Project**
Fall, spring. 5 credits. For M.Eng. students.

Identification, analysis, design, and evaluation of feasible solutions to some applied problem in the OR&IE field. A formal report and oral defense of the approach and solution are required.
OR&IE 670 Statistical Principles
Fall. 4 credits. Co-requisite: OR&IE 650 or equivalent.
Review of distribution theory of special interest in statistics: normal, chi-square, binomial, Poisson, t, and F; introduction to statistical decision theory; sufficient statistics; theory of minimum variance unbiased point estimation; maximum likelihood and Bayes estimation; basic principles of hypothesis testing, including Neyman-Pearson Lemma and likelihood ratio principle; confidence interval construction; introduction to linear models.

OR&IE 671 Intermediate Applied Statistics
Spring. 3 credits. Prerequisite: OR&IE 670 or equivalent.
Statistical inference based on the general linear model, least-squares estimators and their optimality properties; likelihood ratio tests and corresponding confidence regions, simultaneous inference. Applications in regression analysis and ANOVA models. Variance components and mixed models. Use of the computer as a tool for statistics is stressed.

OR&IE 672 Selected Topics in Environmental Statistics (also BTRY 672)
Fall, spring. 2 credits. Prerequisite: ENGR 270 or equivalent.
For description, see Biometry 672.

OR&IE 676 Statistical Analysis of Life Data
Fall. 3 credits. Prerequisite: OR&IE 671 or equivalent.

OR&IE 678 Asymptotic Methods in Statistics
Fall. 3 credits. Prerequisite: OR&IE 670 or equivalent.
Topics from: large-sample behavior of MLEs and other estimates; chi-square, likelihood ratio, and related tests; Pitman and Bahadur efficiency; LAN families and LAM likelihood ratio principle; confidence intervals. Applications in regression analysis and ANOVA models. Variance components and mixed models. Use of the computer as a tool for statistics is stressed.

THEORETICAL AND APPLIED MECHANICS

Basics in Engineering Mathematics and Mechanics

[T&AM 123 Sensors and Actuators (also Engr 123)]
Fall. 3 credits. Not offered 1995-96.
For description, see Engineering Common Courses.

[T&AM 181 Structures and Machines in Urban Society (also Engr 181)]
Fall. 3 credits.
For description, see Engineering Common Courses.

T&M 202 Mechanics of Solids (also ENGRD 202)
Fall, spring. 3 credits.
For description, see Engineering Common Courses.

T&M 203 Dynamics (also ENGRD 203)
Fall, spring. 3 credits. Prerequisite: T&AM 202, coregistration in Mathematics 294, or permission of instructor.
For description, see Engineering Common Courses.

Engineering Mathematics

T&M 191 Calculus for Engineers (also Mathematics 191)
Fall. 4 credits. Limited to 25 students per section.
Prerequisite: 3 years of high school mathematics, including trigonometry. Plane analytic geometry, differential and integral calculus, and applications.

T&M 192 Calculus for Engineers (also Mathematics 192)
Fall, spring, or summer. 4 credits.
Methods of integration, hyperbolic functions, polar coordinates, infinite series, complex numbers, introduction to partial derivatives, introduction to surface and volume integrals.

T&M 293 Engineering Mathematics (also MATH 293)
Fall, spring. 4 credits. Prerequisite: Mathematics/T&AM 192 plus a knowledge of computer programming equivalent to that taught in Engineering Common Courses 100. In exceptional circumstances, Mathematics 192 and 293 may be taken concurrently.
Introduction to physical vectors, linear algebra and matrix theory, inner product spaces. May include computer use in solving problems.

T&M 294 Engineering Mathematics (also MATH 294)
Fall, spring. 4 credits. Prerequisite: Mathematics/T&AM 192 or equivalent.
Special functions, initial value, boundary value, and eigenvalue problems in linear partial differential equations; introduction to nonlinear ordinary differential equations. Use of computer algebra to solve problems. Introduction to probability and statistics.

T&M 311 Advanced Engineering Analysis II
Spring. 3 credits. Prerequisite: Mathematics/T&AM 294 or equivalent.
Introduction to complex variable theory. Cauchy's Integral theorem, Laurent series, classification of singularities, method of residues. Applications include conformal mapping (Laplace equation), Laplace transform, Fourier transform, Fourier series, transfer function, solution and stability of linear systems, Fast Fourier Transform. Examples are drawn from fluid mechanics, heat transfer, electromagnetics, and elasticity.

T&M 610 Methods of Applied Mathematics I
Fall. 3 credits. Intended for beginning graduate students in engineering and science. An intensive course, requiring more than twice as many hours as is normally available to undergraduates (see T&AM 310-311) but open to exceptional undergraduates with permission of instructor.
Emphasis is on applications. Linear algebra, calculus of several variables, vector analysis, series, ordinary differential equations, complex variables.

T&M 611 Methods of Applied Mathematics II
Spring. 3 credits. Prerequisite: T&AM 610 or equivalent.
Emphasis on applications. Partial differential equations, transform techniques, tensor analysis, calculus of variations.
T&AM 612 Methods of Applied Mathematics III
Fall. 3 credits. Prerequisite: T&AM 610 or 611 or equivalent. Offered alternate years. First of a 6-credit sequence (T&AM 612 and 613) that develops advanced mathematical techniques for engineers and applied physicists. Review of complex variable theory, conformal mapping, special functions, integral transform, Wiener-Hopf technique, and singular integral equations. Problems drawn from electromagnetics, elasticity, fluid mechanics, heat transfer, and acoustics.

T&AM 613 Methods of Applied Mathematics IV
Spring. 3 credits. Prerequisite: T&AM 612 or equivalent. Offered alternate years. Topics include asymptotic behavior of solutions of linear and nonlinear ODE (e.g., the WKB and multiple-scale methods), asymptotic expansion of integrals (method of steepest descent, stationary phase and Laplace methods). Regular and singular perturbation methods for PDE (e.g., method of composite expansions). Other topics (depending on instructor) may include normal forms, center manifolds, Liapunov-Schmidt reductors, Stokes phenomenon. The course may also include computer algebra (MACSYMA) exercises at the option of the instructor.

T&AM 614 Topics in Applied Mathematics V
Fall. 3 credits. Prerequisites: T&AM 610-613 or equivalent. Offered alternate years. Not offered 1995-96. Topics such as nonlinear wave motion, bifurcation theory, or computer algebra will be covered, depending on the instructor and student interest.

T&AM 615 Topics in Applied Mathematics VI
Spring. 3 credits. Prerequisites: T&AM 610-613 or equivalent. Offered alternate years. Not offered 1995-96. See T&AM 613 for description.

Continuum Mechanics
T&AM 501 Topics in Composites I
Fall. 1 to 3 credits (1 credit each topical minicourse)
Analysis of Composite Structures (T. J. Healey)
Linear analysis of thin structural members possessing anisotropic material properties relevant to a composite. Focus on analysis, rather than on modeling or design. Topics include: (1) analysis of rods, beams, and sandwich beams; (2) analysis of thin, orthotropic plates; and (3) analysis of thin orthotropic cylindrical shells. Grading may be based on homework and a short final examination.

Biological Composites I (J. T. Jenkins)
Overview of the microstructural features and the origin of the mechanical properties of bone and soft tissues, such as tendon, ligament, muscle, and skin, and outline of their use as structural components. Survey of design principles for composite materials that mimic those found in biological systems. Final grade determined by the student's in-class presentation on a relevant topic.

Design Principles for Composite Structures (R. H. Lance)
A review of thermo-mechanical behavior of anisotropic, orthotropic, and transversely isotropic materials. Includes development of pertinent equations for laminated materials and sandwich structures. Application is made to the design and analysis of rods, beams, tubes, and plates. Examples drawn from space structures.

Mechanical Testing of Composite Constituents (P. Petrina)
Focuses on the theoretical and experimental characterization of strength and life of advanced composite constituents and materials. Includes specimen preparation, testing, data reduction, and analysis. Perform laboratory experiments to determine short-term strength distribution of fiber material, and the evaluation of interface and life strength.

Reliability Models for Composites (S. L. Phoenix)
Surveys statistical models for the strength of fibers, fiber bundles, and composites with emphasis on reliability assessment. Features include the roles of the Weibull distribution, size effects, and the micromechanics of stress transfer around fiber breaks. Time-dependent failure in fatigue is considered as an extension involving matrix creep and interface debonding. Grades are based on several homework tasks.

T&AM 502 Topics in Composites II
Spring. 1 to 3 credits (1 credit each topical minicourse)
Design and Manufacturing of Laminated Composites (P. Petrina)
Students learn to manufacture and to perform analysis and design of laminated composite structures. Practical applications will include manufacturing and analysis of bars, tubes, sandwich beams, and plates. Each student will have a chance to make several types of composite structures and have access to software for the analysis.

Nondestructive Testing of Composites (W. Sacht)
Overview of nondestructive testing techniques that are used to monitor composite material-fabrication procedures to determine the mechanical properties of composite specimens and to assess the integrity of composite structural components. A survey of current NDT research. Topics include (1) goals and problems of NDT/NDE measurements in composites, (2) survey of NDT technologies applicable to measurements in composites, (3) active (UT) and passive (AE) ultrasonic NDT measurements in composite materials, and (4) developments and directions of NDT research applicable to composite materials evaluation. Grade based on laboratory work and a written response to a specific composite NDT problem.

T&AM 555 Introduction to Composite Materials (also M&AE 555 & M&AE 655)
Fall. 4 credits. Introduction to composite materials: varieties of reinforcements, matrix materials, and their properties. Mechanics and failure analysis of lamina, laminates, and wound structures. Introduction to micromechanics theories of composites, manufacturing methods, fabrication and assembly techniques, composite applications, environmental effects.

T&AM 569 Sensors
Fall. 3 credits. Not offered 1995-96. This course deals with the general properties of sensors and actuators used in measurement and process-control applications involving thermal and mechanical quantities. Considered are sensors and actuators based on a broad range of physical transduction phenomena. Attention is given to the development of sensor models and criteria for evaluating the general performance characteristics of a sensor, including its transduction characteristics and its measurement field. Also studied are algorithms for processing sensor signals to recover the characteristics of the sensor or to remove its effect in a specific measurement application. An integral part of the course is the Sensors Laboratory, which provides students with hands-on opportunities for measuring the characteristics and operational parameters of a broad range of thermo-mechanical sensors.

T&AM 591 Master of Engineering Design Project I
Fall. 3-6 credits. M. Eng. (Mechanics) project related to the mechanics of advanced composites and structures.

T&AM 592 Master of Engineering Design Project II
Spring. 3-15 credits. M. Eng. (Mechanics) project related to the mechanics of advanced composites and structures.

T&AM 655 Advanced Composite Materials and Structures (also M&AE 655)

T&AM 663 Solid Mechanics I
Fall. 4 credits. Rigorous introduction to small-strain solid mechanics with emphasis on linear elasticity, stress, strain, tensors, balance laws, energy principles, general theory of linear elasticity, and solutions of elementary boundary-value problems.

T&AM 664 Solid Mechanics II
Spring. 4 credits. Prerequisites: Mathematics 610 and T&AM 663, or equivalent. Preparation for advanced courses in solid mechanics. Singular solutions in linear elasticity, large deformations, nonlinear elasticity, linear visco-elasticity, mechanics of defects (cracks and dislocations), classical plasticity, and constitutive relations.

T&AM 751 Continuum Mechanics and Thermodynamics
Fall. 3 credits. Prerequisites: T&AM 610 and 611, and 663 and 664 or equivalents. Offered alternate years.

Kinematics, conservation laws, the entropy inequality, constitutive equations, frame indifference, material symmetry. Rate-dependent materials and materials with internal variables.
[T&AM 752 Nonlinear Elasticity] Fall. 3 credits. Prerequisites: T&AM 610 and 611; and 663 and 664 or equivalents. Offered alternate years. Not offered 1995-96. Review of kinematics and constitutive theory appropriate for large deformations of nonlinearly elastic bodies. The basic field equations of nonlinear elastostatics and elastodynamics. Exact solutions of special problems. Linearization and stability. Nonlinear theories of thin structural members and their relationship to the three-dimensional theory. Introduction to static bifurcation theory with applications to strings, rods, plates, and shells.

[T&AM 753 Fracture] Fall. 3 credits. Prerequisites: T&AM 610 or 611; and 663 and 664 or equivalents. Offered alternate years. Topics will be selected from (1) elastic fracture mechanics; K, small-scale yielding, solutions of elastic problems; (2) nonlinear rate-independent, small-deformation fracture mechanics: plastic fracture, J-integral, small-scale yielding; (3) rate-dependent fracture mechanics: dynamic fracture, creep fracture; (4) mechanics of failure in polymers, ceramics, composites, and metals; void growth, load transfer between fibers, crazing.


[T&AM 759 Nonlinear Elasticity] Spring. 3 credits. Prerequisite: T&AM 570 or equivalent. Offered alternate years. Not offered 1995-96. Review of Lagrangian mechanics; Hamilton's principle, the principle of least action, and related topics from the calculus of variations; Hamilton's canonical equations; approximate methods for two-degrees-of-freedom systems (Lie transforms); canonical transformations and Hamilton-Jacobi theory, KAM theory.


Dynamics and Space Mechanics


[T&AM 578 Nonlinear Dynamics and Chaos] Spring. 3 credits. Prerequisite: Mathematical Physics/ T&AM 293 or equivalent. Introduction to nonlinear dynamics, with applications to physics, engineering, biology and chemistry. Emphasizes analytical methods, concrete examples, and geometric thinking. Topics: One-dimensional systems. Bifurcations. Phase plane: Nonlinear oscillators. Lorenz equations, chaos, strange attractors, fractals, iterated mappings, period doubling, renormalization.

[T&AM 671 Advanced Dynamics] Spring. 3 credits. Prerequisite: T&AM 570 or equivalent. Offered alternate years. Not offered 1995-96. Review of Lagrangian mechanics; Hamilton's principle, the principle of least action, and related topics from the calculus of variations; Hamilton's canonical equations; approximate methods for two-degrees-of-freedom systems (Lie transforms); canonical transformations and Hamilton-Jacobi theory, KAM theory.

[T&AM 672 Celestial Mechanics (also Astronomy 579)] Spring. 3 credits. Offered alternate years. Not offered 1995-96. Description of orbits; 2-body, 3-body, and n-body problems; Hill curves, libration points and their stability; capture problems; virial theorem. Osculating elements, perturbation equations; effects of gravitational potentials, atmospheric drag, and solar radiation forces on satellite orbits; secular perturbations, resonances, mechanics of planetary rings.


[T&AM 675 Nonlinear Vibrations] Fall. 3 credits. Prerequisite: T&AM 578 or equivalent. Offered alternate years. Quantitative analysis of weakly nonlinear systems in free and forced vibrations, perturbation methods, averaging method. Applications to problems in mechanics, physics, and biology. Additional topics may include Hopf bifurcation, Invariant manifolds, coupled oscillators, vibrations in continuous media, normal forms, and exploitation of symmetry.


Special Courses, Projects, and Thesis Research

T&AM 491-492 Project in Engineering Science 491, fall; 492, spring. 1-4 credits, as arranged. Projects for undergraduates under the guidance of a faculty member.

T&AM 796-800 Topics in Theoretical and Applied Mechanics Fall, spring. 1-3 credits, as arranged. Special lectures or seminars on subjects of current interest. Topics are announced when the course is offered.

T&AM 890 Master's Degree Research in Theoretical and Applied Mechanics Fall, spring. 1-15 credits, as arranged. S-U grades optional. Thesis or independent research at the M.S. level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

T&AM 990 Doctoral Research in Theoretical and Applied Mechanics Fall, spring. 1-15 credits, as arranged. S-U grades optional. Thesis or independent research at the Ph.D. level on a subject of theoretical and applied mechanics. Research is under the guidance of a faculty member.

FACULTY ROSTER

Abel, John F., Ph.D., U. of California at Berkeley. Prof., Civil and Environmental Engineering
Albright, Louis D., Ph.D., Cornell U. Prof., Agricultural and Biological Engineering
Allenberger, Richard, Ph.D., Stanford U. Assoc. Prof., Geological Sciences
Aneshansley, Daniel J., Ph.D., Cornell U. Assoc. Prof., Agricultural and Biological Engineering
Anton, A. Brad, Ph.D., California Inst. of Technology. Assoc. Prof., Chemical Engineering
Attoh, K., Ph.D., Northwestern U. Assoc. Prof., Geological Sciences
Auer, Peter L., Ph.D., California Inst. of Technology. Prof., Mechanical and Aerospace Engineering
Avedissian, G. Thomas, Ph.D., Princeton U. Prof., Mechanical and Aerospace Engineering
Ballantyne, Joseph M., Ph.D., Massachusetts Inst of Technology. Prof., Electrical Engineering
Barazangi, Muawia, Ph.D., Columbia U. Senior Scientist, Geological Sciences
Bartel, Donald L., Ph.D., U. of Iowa. Prof., Mechanical and Aerospace Engineering
Barrett, James A., Ph.D., Purdue U. Assoc. Prof., Agricultural and Biological Engineering
Bassett, William A., Ph.D., Columbia U. Prof., Geological Sciences
Bitterman, Boris W., Ph.D., Massachusetts Inst. of Technology. Walter S. Carpenter, Jr. Professorship in Engineering, Applied and Engineering Physics
Bertozzi, Andrea L., Ph.D., Harvard U. J. Presby Levis Professor of Engineering, 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., Geographical Sciences
Birman, Kenneth P., Ph.D., U. of California at Berkeley. Prof., Computer Science
Bisogni, James J., Ph.D., Cornell U. Assoc. Prof., Civil and Environmental Engineering
Blakeley, John M., Ph.D., Glasgow U. (Scotland) Prof., Materials Science and Engineering
Bland, Robert G., Ph.D., Cornell U. Prof., Operations Research and Industrial Engineering
Bloom, Arthur L., Ph.D., Yale U. Prof., Geological Sciences
Boeker, John F., Ph.D., Cornell U. Prof., Mechanical and Aerospace Engineering
Boyd, Iain, Ph.D., U. of Southampton (England) Asst. Prof., Mechanical and Aerospace Engineering
Brock, Joel D. Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Applied and Engineering Physics
Brown, Geoffrey M., Ph.D., U. of Texas. Assoc. Prof., Electrical Engineering
Brown, Larry D., Ph.D., Cornell U. Prof., Geological Sciences
Brunsveld, Wilfried H., Ph.D., U. of California at Davis. Prof., Civil and Environmental Engineering
Buhman, Robert A., Ph.D., Johns Hopkins U. John Edson Sweet Professor of Engineering, Applied and Engineering Physics
Burns, Joseph A., Ph.D., Cornell U. Irving Porter Church Professor in Engineering, Theoretical and Applied Mechanics
Cady, K. Bingham, Ph.D., Massachusetts Inst. of Technology. Asst. Prof., Theoretical and Applied Mechanics
Capps, Susan G., Ph.D., North Carolina State U. Asst. Prof., Agricultural and Biological Sciences
Cardie, Claire T., Ph.D. U. of Massachusetts at Amherst. Asst. Prof., Computer Science
Cathles, Lawrence M. III, Ph.D., Princeton U. Prof., Geological Sciences
Caughey, David A., Ph.D., Princeton U. Prof., Mechanical and Aerospace Engineering
Chiang, Hsiao-Dong, Ph.D., Technische Hoch., München (Germany). Prof., Applied and Engineering Physics
Chiraghead, Harold G. Ph.D., Cornell U. Prof., Applied and Engineering Physics
Data, Ashim K., Ph.D., U. of Florida. Assoc. Prof., Agricultural and Biological Engineering
Dawson, Paul R., Ph.D., Colorado State U. Prof., Mechanical and Aerospace Engineering
deBoer, P. Tobias, Ph.D., U. of Maryland Prof., Mechanical and Aerospace Engineering
Deierlein, Gregory G., Ph.D., U. of Texas at Austin. Assoc. Prof., Civil and Environmental Engineering
Delchamps, David F., Ph.D., Harvard U. Assoc. Prof., Electrical Engineering
Derksen, Richard C., Ph.D., U. of Illinois. Asst. Prof., Agricultural and Biological Engineering
Dick, Richard I., Ph.D., U. of Illinois. Joseph P. Riley Professor of Engineering, Civil and Environmental Engineering
Dieckmann, Rudiger, Ph.D., Technical U. of Clausthal. Prof., Materials Science and Engineering
Donald, Bruce, Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Computer Science
Duncan, Michael, Ph.D., California Inst. of Technology. Assoc. Prof., Chemical Engineering
Eastman, Lester F., Ph.D., Cornell U. Given Foundation Professor of Engineering, Electrical Engineering
Engstrom, James R., Ph.D., California Inst. of Technology. Asst. Prof., Chemical Engineering
Farley, Donald T., Ph.D., Cornell U. Prof., Electrical Engineering
Finn, Terrence H., Ph.D., Harvard U. Prof., Electrical Engineering
Fisher, Elizabeth M., Ph.D., U. of California at Berkeley. Asst. Prof., Mechanical and Aerospace Engineering
Fleischmann, Hans H., Ph.D., Technische Hoch., München (Germany). Prof., Applied and Engineering Physics
Furr, Ronald B., Ph.D., Iowa State U. Prof., Agricultural and Biological Engineering
Grebremedhin, Kifle G., Ph.D., U. of Wisconsin. Assoc. Prof., Agricultural and Biological Engineering
Grosset, James M., Ph.D., Stanford U. Prof., Civil and Environmental Engineering
Hairer, Ernst, Ph.D., U. of Manchester. Prof., Computer Science
Hirzinger, Thomas A., Stanford U. Asst. Prof., Computer Science
Hirzinger, Monika R., Ph.D., Princeton U. Assoc. Prof., Computer Science
Hopcroft, John E., Ph.D., Stanford U. Joseph Silbert Dean of Engineering, Prof., Computer Science
Hovem, Kenneth C., Ph.D., Cornell U. Prof., Civil and Environmental Engineering
Huttenlocher, Daniel, Ph.D., Massachusetts Inst. of Technology. Assoc. Prof., Computer Science
Ingraffea, Anthony R., Ph.D., U. of Colorado. Dwight C. Baum Professor of Engineering, Civil and Environmental Engineering
Irwin, Lynne H., Ph.D., Texas A & M U. Assoc. Prof., Agricultural and Biological Engineering
Isaacson, Michael, Ph.D., U. of Chicago. Prof., Applied and Engineering Physics
Isacks, Bryan L., Ph.D., Columbia University. William J. and Katherine Snee Prof. of Geological Sciences
Jackson, Peter L., Ph.D., Stanford U. Assoc. Prof., Operations Research and Industrial Engineering
Jenkins, James T., Ph.D., Johns Hopkins U. Prof., Theoretical and Applied Mechanics
Jewell, William J., Ph.D., Stanford U. Prof., Agricultural and Biological Engineering
Jirka, Gerhard H., Ph.D., Massachusetts Inst. of Technology. Prof., Civil and Environmental Engineering
Johnson, C. Richard, Jr., Ph.D., Stanford U. Prof., Electrical Engineering
Jordan, Teresa, Ph.D., Stanford U. Assoc. Prof., Geological Sciences
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<th>Name</th>
<th>Degree, University and Notes</th>
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<tr>
<td>Karig, Daniel E.</td>
<td>Ph.D., U. of California at San Diego. Prof., Geological Sciences</td>
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<td>Kay, Robert W.</td>
<td>Ph.D., Columbia U. Prof., Geological Sciences</td>
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<td>Kay, Suzanne M.</td>
<td>Ph.D., Brown U. Assoc. Prof., Geological Sciences</td>
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<td>Kelley, Michael C.</td>
<td>Ph.D., U. of California at Berkeley Prof., Electrical Engineering</td>
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<td>Kintner, Paul M.</td>
<td>Ph.D., U. of Minnesota. Prof., Electrical Engineering</td>
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<td>Kozen, Dexter Ph.D.</td>
<td>Cornell U. Prof., Professor in Engineering, Computer Science</td>
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<td>Kramer, Edward J.</td>
<td>Ph.D., Carnegie Inst. of Technology. Samuel B. Eckert Prof. of</td>
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<td>Materials Science and Engineering</td>
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<td>Kussies, J.</td>
<td>Ph.D., Helsinki U. of Technology (Finland). Prof., Electrical</td>
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<td>Kulhawy, Fred H.</td>
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<td>Kuske, Bruce R.</td>
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<td>Kuo, Hsiang Li</td>
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<td>Lo, Yu-hwa, Ph.D.</td>
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<td>Louge, Michel Y.</td>
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<td>Lowrance, Richard V. E.</td>
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<td>Lumley, John L.</td>
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<td>MacDonald, Noel C.</td>
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<td>Carnegie Mellon. Asst. Prof., Operations Research and Industrial</td>
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Stewart, Harry E., Ph.D., U. of Massachusetts at Amherst. Assoc. Prof., Civil and Environmental Engineering
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GRADUATE SCHOOL

Walter Cohen, dean
Christine Ranney, associate dean
Eleanor S. Reynolds, associate dean
Hilary Ford, assistant dean

Graduate study at Cornell is pursued through the Graduate School, which administers the many graduate fields of study, or through the various graduate professional schools and colleges.

GRADUATE SCHOOL

The graduate program at Cornell permits an unusual degree of accommodation to the needs and interests of the individual student. Degree requirements are kept to a minimum. There are no specific course or credit requirements for the advanced general degrees of Master of Arts, Master of Science, and Doctor of Philosophy, but only such general requirements that best accomplish the aim of graduate study: a period of study in residence, the mastery of one subject, adequate knowledge of allied subjects, oral examinations to establish competency for presentation of a dissertation or thesis, and a satisfactory dissertation or thesis. Certain advanced professional degree programs have specific course or credit requirements that are determined by the faculty of the professional school or college in which the degrees are offered.

A close working relationship between the student and faculty members is essential to the graduate program at Cornell. Under the Special Committee system the student is guided by, and works with, at least two or three faculty members chosen by the student to represent his or her major and minor subjects. The major subject representative is the chair of the Special Committee who usually has the primary responsibility for directing the student’s thesis or dissertation research.

Students who want to use the university’s facilities for intensive specialized training only and who do not want to become degree candidates may apply for admission as non-degree students.

REQUIREMENTS FOR ADMISSION

To be admitted to the Graduate School, an applicant should:

1) hold a baccalaureate degree or its equivalent, granted by a faculty or university of recognized standing;
2) have adequate preparation for graduate study in the chosen field of instruction;
3) have fluent command of the English language;
4) present evidence of promise in advanced study and research; and
5) take the Graduate Record Examinations General Test for those fields that require the GREs.

Before admission can be final, all applicants whose native language is not English must provide proof of competency in the English language. Acceptable proof could be

1) a Test of English as a Foreign Language (TOEFL) score of 550 or higher;
2) a degree from a college or university in a country where the native language is English; or
3) two or more years of study in an undergraduate or graduate program in a country where the native language is English.

Information on times and places for the TOEFL examination and Graduate Record Examinations and application forms may be obtained from the Educational Testing Service, Princeton, New Jersey 08541, U.S.A.

Applications for admission to the Graduate School may be submitted at any time during the year. Many fields, however, require that applicants for fall admission submit their completed applications by January 10.

Applicants who are also applying for Cornell Graduate School fellowship consideration must submit their completed applications and supporting credentials by January 10.

Inquiries regarding admission and fellowships should be addressed to the Graduate School Admissions Office, Cornell University, Sage Graduate Center, Ithaca, New York 14853-6201.

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 assistanships should be addressed to the graduate faculty representative in the particular field.

More detailed information may be obtained from the following publications: the Graduate School Catalog, available from Cornell University Catalogs, 122 Maple Avenue, Ithaca, New York 14850-4902, and Cornell University, the Graduate School, Application, available from the Graduate School, Cornell University, Sage Graduate Center, Ithaca, New York 14853-6201.

Note: Programs leading to the degrees of Doctor of Law (J.D.), Doctor of Medicine (M.D.), Doctor of Veterinary Medicine (D.V.M.), and Master of Business Administration (M.B.A.) are not administered by the Graduate School. Information on those programs can be obtained from the Law School, the Medical College (New York City), the College of Veterinary Medicine, and the Johnson Graduate School of Management respectively.

Information concerning admission requirements and courses of study for degrees not administered by the Graduate School may be obtained from the several schools and colleges that administer them.
SCHOOL OF HOTEL ADMINISTRATION

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Michael H. Redlin, associate dean for academic affairs
David W. Butler, associate dean for executive education
Susanne DeGraba, assistant dean for finance and administration
James E. Hisie, managing director of the Statler Hotel and J. Willard Marriott Executive Education Center
Cheryl S. Farrell, director of student services
Yariela Kerr, director of minority student programs
A. Neal Geller, Richard J. and Monene P. Bradley director for graduate studies
Katherine S. Laurence, director of academic studies
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Harry R. Keller, director of alumni affairs
Glenn Withiam, director of publications
Fred Conner, senior editor of the Cornell Hotel and Restaurant Administration Quarterly
Mark Adams, director of communications

DEGREE PROGRAMS

Hotel and Restaurant Administration

Degree

| B.S. |
| M.P.S. |
| Ph.D. |

FACILITIES

Statler Hall. Statler Hall is a unique building designed expressly to meet the needs of the faculty and students of the School of Hotel Administration. The building serves both practical and theoretical instruction, houses classrooms, lecture rooms, laboratories, a library, a computer center, a beverage-management center, an auditorium, and the Statler Hotel and J. Willard Marriott Executive Education Center. Statler Hall and the Statler Hotel were designed expressly for the school's academic and executive-education programs, providing students with training and work experience in facilities similar to those in which they will work after graduation.

The School of Hotel Administration Library has the largest single collection of hospitality-related materials in the United States. The collection contains approximately 25,000 volumes, 1,000 videotapes, numerous ephemera and memorabilia (such as photographs, menus, and rare books), and more than 800 magazine, newsletter, and newspaper subscriptions. Materials on lodging, foodservice, travel and tourism, and general business topics comprise the core of the library's collections. Among the library's special features are numerous computerized information resources, including NEXIS, Dow Jones, ABI/INFORM, and The International Hospitality and Tourism Database, an extensive and unique index to hospitality articles. Information resources and services for the hospitality industry are available for a fee through the library's HOSTLINE service. In addition to offering an excellent collection of materials and a dignified and refined study space, the Hotel School library extends quality service to every student. Please visit us and benefit from our collections and services.

Statler Hotel and J. Willard Marriott Executive Education Center. The Statler Hotel comprises 150 guest rooms, an executive education center, restaurants, a lounge, and the university's faculty and staff club. It demonstrates the very finest in hospitality and hospitality-education practices. The Statler is an independent, self-sustaining teaching hotel that provides quality food, beverage, meeting, and lodging services to the Cornell community and campus visitors, including parents and those who visit Cornell as part of the application process. In addition, the hotel is a practice-management facility for certain classes, internships, and independent-study projects. It offers part-time jobs to approximately 300 students each semester with preference given to students in the hotel school.

UNDERGRADUATE CURRICULUM

The School of Hotel Administration offers education in the numerous disciplines required for modern management in the global hospitality industry. Included in the core curriculum are courses in management, human resources, financial management, food and beverage operations, marketing, tourism, property asset management, communications, and law. Students also are encouraged to pursue a broad range of elective courses, including those in the humanities, social sciences, and natural sciences, as preparation for assuming leadership positions in the business and local community. For more complete information about undergraduate program requirements, see the school's student handbook or course supplement (available in room 174 Statler Hall).

Requirements for Graduation

Regularly enrolled undergraduate students in the School of Hotel Administration are candidates for the degree of Bachelor of Science. The requirements for that degree are:

1) completion of eight terms in residence for those who entered as freshmen; terms of residence for transfer students are determined by the amount of transfer credit awarded;

2) completion, with a minimum cumulative grade-point average of 2.0 (including a grade-point average of 2.0 in a full-time schedule of courses in the final semester), of 120 required and elective credits, as set forth in the table on the following page;

3) qualification in one language other than English. This requirement may be met by any one of the following: 1) three years of high school study of one foreign language; 2) score of 560 on Cornell Placement Test; 3) pass 121 and 122 (8 credits) and score 560 on Cornell Placement Test; or 4) pass 123.

4) completion of two units of practice credit prior to the last term of residence, as defined on the following page;

5) completion of the university requirement in physical education.

Suggested course programs appear on the following pages. The core courses account for 69 of the 120 credits needed for graduation, the selected concentration accounts for 12 credits, and 18 credits are allotted for distributive electives. The remaining 21 credits may be earned in courses chosen from the offerings of any college of the university, provided that the customary requirements for admission to such courses are met. Note: Students who matriculated before the fall of 1993 should refer to the Hotel School's "course supplement" for graduation requirements.

Students in the School of Hotel Administration who plan to attend summer school at Cornell or any other four-year college or university, with the expectation that the credit earned will be counted toward the Cornell degree in hotel administration, must obtain the approval of the school in advance. Without advance approval, such credit may not count toward the degree.

Credit earned in military science, aerospace studies, or naval-science courses may be counted in the 21-credit group of free electives.

Transfer Credit Policy

Transfer students are required to complete all degree requirements with at least seventy-five (75) credits at Cornell University, of which a minimum of sixty (60) must be in courses offered by the Hotel School, and nine (9) must be in distributive electives taken outside the Hotel School. Thus, a maximum of forty-five (45) hours in transfer credit may be allowed from other accredited colleges or universities, as follows:

...
Prior to registering for the last semester. Further details are set forth in the Practice Credit Handbook for Undergraduates in the School of Hotel Administration, available in the school’s Career Services Office, room 255 Statler Hall.

Management-Intern Program

Hotel School juniors and seniors have a unique opportunity to gain invaluable knowledge and experience in the hospitality industry through the management intern program. Students receive 12 academic credits, 1 practice credit, and may petition on an ad-hoc basis to have a portion of the academic credits applied toward their concentration. While on the internship, tuition, and a salary may be paid by the sponsoring organization. Positions are available in the U.S. and internationally. Sponsors include hotels, restaurants, casinos, corporate offices, consulting firms, and clubs. Application should be made one semester in advance. Information meetings are held at the beginning of each semester and are open to all students. See H Adm 493 and 494 for more details. Information about the management intern program also is available in the Career Services Office, 255 Statler Hall.

Study Abroad

Programs providing an opportunity to study in a foreign country and develop an awareness of the international component of the hospitality industry can contribute to each student’s total educational experience. Students in recent years have studied in Italy, Spain, France, England, and many other countries. Information on the study-abroad programs operating during the summer and academic year is available at the Cornell Abroad Office (in Uris Hall).

Students should discuss their plans with the school’s study-abroad faculty representative and the director of student services so that all petition and credit-evaluation procedures are followed.

Part-Time Study

Generally, part-time study is not allowed. Exceptions can be made for employee degree candidates, students who have medical reasons for a reduced schedule, or other extenuating circumstances. In no event shall a student be allowed to enroll on a part-time basis during the last term of study. Further details on part-time study may be found in the school’s student handbook (available in room 174 Statler Hall).

Grading System

Letter grades ranging from A+ to F are given to indicate academic performance in each course. These letter grades are assigned a numerical value for each term average as follows: A is equivalent to 4.0, B to 3.0, C to 2.0, D to 1.0, F to 0. For good standing, the student must maintain a minimum average of 2.0. Of the free-elective courses, a maximum of 4 credits each term may be taken on a “satisfactory-unsatisfactory” (S-U) basis. Students should be aware that a satisfactory grade equals “C+” or above and an unsatisfactory grade equals “D+” or lower. Courses taken S-U may be counted only as free electives.


table

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course Description</th>
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<tbody>
<tr>
<td>12</td>
<td>Management Operations: Hotel Administration</td>
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<tr>
<td>6</td>
<td>Human-Resources Management: Hotel Administration</td>
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<tr>
<td>12</td>
<td>Financial Management: Hotel Administration</td>
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<td>12</td>
<td>Food and Beverage Management: Hotel Administration</td>
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<tr>
<td>6</td>
<td>Marketing and Tourism: Hotel Administration</td>
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<td>6</td>
<td>Property Asset Management: Hotel Administration</td>
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<td>6</td>
<td>Communication: Hotel Administration</td>
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<td>6</td>
<td>Operations Management and Information Technology: Hotel Administration</td>
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<td>3</td>
<td>Law: Hotel Administration</td>
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<tr>
<td>6</td>
<td>Economics: Micro and Macro</td>
</tr>
<tr>
<td>69</td>
<td>Specifically required credits</td>
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<tr>
<td>12</td>
<td>Concentration</td>
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<tr>
<td>18</td>
<td>Distributive electives</td>
</tr>
<tr>
<td>21</td>
<td>Free electives</td>
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</tbody>
</table>

Total credits required for graduation 120

Typical Course Sequences

The following arrangements of courses tend to be more fixed in the freshman and sophomore years, with a greater degree of flexibility characterizing the upperclass years.

Freshman Year

Typically, a freshman schedule will consist of 15 to 16 credits each term, to include the following:

<table>
<thead>
<tr>
<th>Required courses</th>
<th>Credits</th>
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<tbody>
<tr>
<td>H Adm 105, Rooms Division Management</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 115, Organizational Behavior and Interpersonal Skills</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 121, Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 136, Food and Beverage Management</td>
<td>4</td>
</tr>
<tr>
<td>H Adm 165, Managerial Communication I</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 174, Microcomputing</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 175, Quantitative Methods</td>
<td>3</td>
</tr>
<tr>
<td>H Adm 191, Microeconomics for the Service Industries</td>
<td>3</td>
</tr>
<tr>
<td>Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Distributive or free electives</td>
<td>3</td>
</tr>
</tbody>
</table>

31
Sophomore Year

Required courses Credits
H Adm 211, Human Resources Management 3
H Adm 221, Managerial Accounting 3
H Adm 222, Finance 3
H Adm 236, Culinary Theory and Practice 4
H Adm 243, Principles of Marketing 3
H Adm 255, Hotel Development and Planning 3
Distributive electives 3–6
Free electives 3–6
25–31

Junior Year

Required courses Credits
H Adm 301, Strategic Management 3
H Adm 321, Hospitality Financial Management 3
H Adm 335, Restaurant Management 4
H Adm 355, Hospitality Facilities Operations 3
H Adm 365, Managerial Communication: Principles and Practices 3
H Adm 387, Business and Hospitality Law 3
Concentration 6
Free electives 3–6
28–31

Senior Year

Required courses Credits
Marketing Elective 3
Concentration 6
Free electives 15–23
24–32

Required Program for Professional Master's Students

Required courses Credit
H Adm 701, Competitive Strategy for the Hospitality Industry 3
H Adm 702, Human Behavior in Organizations 3
H Adm 711, Human Resources Management 3
H Adm 721, Financial Economics 3
H Adm 722, Hospitality Financial Management 3
H Adm 731, Food and Beverage Management 3
H Adm 741, Marketing Management 3
H Adm 751, Properties Development and Planning 3
H Adm 761, Communication Modules for Master's Students 3
H Adm 771, Quantitative Methods 3
H Adm 772, Information Technology for Hospitality Managers 3
H Adm 791, Service Excellence for Maximum Profit I 3
H Adm 792, Service Excellence for Maximum Profit II 3
H Adm 793, Industry Mentorship 0
H Adm 794, Assessment and Benchmarking for Master's Students 0

Total credits required for first-year professional master's program 64

Course Schedule Information

For up-to-date information about course scheduling, and to obtain a course supplement, contact the hotel school student services office in room 178 Statler Hall, telephone 255-3076.

MANAGEMENT OPERATIONS COURSES

H ADM 100 Principles of Management
Fall. 3 credits. Limited to non-hotel school students. Elective. P. Rainsford.
An introductory survey course in management with general reference toward the hospitality industry. The course is organized around the traditional management functions of planning, organizing, leading, and controlling.

H ADM 102 Distinguished Management Lectures
Fall. 1 credit. Limited to hotel school students except by written permission. Elective. D. Dittman.
A series of lectures given by non-resident speakers prominent in the hotel and restaurant industries or allied fields. Topics include career ladders, company profiles, and business-policy formulation.

H ADM 105 Rooms-Division Management
Fall and spring. 3 credits. Limited to hotel school students. Elective. R. Chase.
An introductory course concentrating on the fundamentals of rooms-division management. Areas of concentration include front-desk operations and the reservations, housekeeping, and telephone departments. Emphasis is on selling strategies, forecasting, rate efficiencies, labor management, and guest relations.

H ADM 201 Strategic Management
Fall and spring. 3 credits. Limited to 45 juniors and seniors per lecture. Prerequisites: H Adm 105, 115, and 211 or equivalents. Required. T. Cullen, P. Rainsford.
Focuses on analysis, planning, change, and implementation issues associated with strategic management, emphasizing the value of analyzing environments and formulating strategies linked to environmental conditions, building on organizational strengths, and defending against organizational weaknesses. Emphasis also on handling ambiguous facts and analysis.

H ADM 203 Club Management
Fall and spring. Fall, second 7 weeks only; spring, first 7 weeks only. 2 credits. Fall, limited to 35 hotel school juniors and seniors; spring, open enrollment. Prerequisite for hotel students: H Adm 105, or equivalent. Elective. R. James.
The study of private membership clubs and club administration. The application of current management principles in a not-for-profit environment is discussed and club management is compared to other areas of the hospitality industry. Topical coverage includes: tournament, facility, and recreation management; legal, financial, and legislative issues; human relations and resource consideration; marketing, pricing policies, and quality standards.

H ADM 204 Rooms-Division Management
Fall, second 7 weeks only. 2 credits. Open enrollment but Hotel students limited to those who matriculated before fall 1993. Does not substitute for H Adm 105. Elective. R. Chase.
An introductory course concentrating on the fundamentals of rooms-division management. Emphasis is on the promotion of business, the provision of facilities, services, and guest entertainment. Contracts and non-contract relationships with the travel industry, terminology, rental-pool agreements, S.E.C. regulations, state statutory requirements, developer-management-owner contracts, and relationships in condominiums are reviewed.

H ADM 208 Franchising in the Hospitality Industry
Fall. 2 credits. Prerequisite: H Adm 121. Elective. M. Noden.
A lecture course in the operation of various types of resort hotels and condominiums. Emphasis is on the promotion of business, the provision of facilities, services, and guest entertainment. Case studies of leading lodging and restaurant companies currently offering franchises will be discussed. Guest speakers from the franchising industry.
H ADM 401 Negotiations in the Hospitality Industry
Spring. 3 credits. Limited to 30 juniors, seniors, and graduate students, with preference given to hotel school seniors and graduate students. Prerequisites: H Adm 115, 302, or equivalents. Elective. T. Simons
Provides hands-on experience in negotiation in a hospitality context. Through role-play exercises, discussion, and writing, students will develop their skills at the fine art of being a tough negotiator with whom people want to continue doing business. Students will improve their comfort level with negotiations and will develop their own personal negotiating style as well as adjusting their style to respond to others' different personalities and negotiation tactics.

H ADM 402 Hospitality Management Seminar
Fall. 1 credit. Limited to 20 seniors and graduate students by permission. Students will be expected to register for H Adm 105. D. Dittman
A weekly meeting with the H Adm 102 speaker of the week. The subject matter varies from week to week, depending on the speaker's area of expertise. The class is relatively unstructured, and students are expected to participate in discussions.

H ADM 404 Entrepreneurship and Small Business Management
Fall and spring. 3 credits. Limited to 20 juniors, seniors, and graduate students. Prerequisite: H Adm 121 or equivalent. Elective. P. Rainford
Focuses on the entrepreneur and the decisions made in planning, financing, developing, and operating a new business venture. Case studies and guest speakers will be used. There will be one major term project, which will require the application of the course material to a field consulting project that will result in written and oral reports to the owner of the business and the Small Business Administration.

H ADM 405 Management Planning for the Hospitality Industry
Spring. 3 credits. Limited to 25 seniors and graduate students. Prerequisites: all required hotel undergraduate courses at the 100, 200, and 300 levels. Elective. T. Hinkin
Focus is on how to think about quality planning and examines situations from three perspectives: the customer, the employee, and management. Designed to provide students with a systematic approach to identifying, prioritizing, and improving key job functions and work processes. Structured as a seminar, requiring active participation in discussion of readings and case analyses.

H ADM 406 Integrated Studies in the Hospitality Industry
Spring. 3 credits. Limited to hotel school seniors. Three Tuesday-night meetings in lieu of examinations. Elective. Faculty
Employs text readings, participation in a simulation of a hotel organization, and guest presentations to explore business missions, objectives, strategies, action plans, and evaluations. As an integrative, summary course, the areas of review and application will involve hotel and food service, marketing, organization, and finance.

H ADM 407 Seminar in Hotel Operations
Spring. 3 credits. Limited to 30 seniors. Estimated cost of field trip, $200. Elective. J. Clark
Seminar course applies management theory to actual hotel operations via semester-long interactions and visits with the department heads and general manager of a medium-to-large-size hotel. Field trip includes attendance at executive committee meeting, presentations by various department heads, and half-day "shadow assignments."

H ADM 408 Casino Management
Fall and spring. 2 credits. Limited to 45 students. Prerequisite: H Adm 321 (concurrent registration acceptable). Estimated cost of field trip, $75. Elective. Faculty
Objectives are to develop an understanding of casino operations within a casino hotel and to develop knowledge of the communication network between the casino and all other departments of the hotel. A field trip is required.

H ADM 409 Airline Management
Spring. 3 credits. Limited to 25 seniors and graduate students, others by permission of instructor. Elective. Not offered 1995–96; next offered spring 1997.
Focuses on domestic and international airline industries and examines both pre- and post- regulatory climates. Emphasis is on dynamic organizational change in response to fluctuating economic and legal conditions. Topics include airline organization, comparative corporate strategies, marketing and distribution networks, and service management, union relations, finance, government regulation, and air transport. Case studies and guest lecturers will be used. Also, using the computer-driven simulation exercise called AIRLINE, student teams will operate a small regional carrier.

H ADM 501 Creative Management for Organizational Change
Through lectures, exercises, and group problem-solving sessions students will explore the characteristics of creative people, organizations, and processes, and obtain an inventory of their own creative ability. Examine blocks to creativity and ways to overcome them, plan tactics for selling ideas, discuss methods for leading creative problem-solving meetings, and analyze strategies for producing organizational change. Organizational leaders will present problems for which students will develop creative solutions.

H ADM 603 International Management
Spring. 3 credits. Limited to 15 students. Prerequisites: H Adm 212, 301, 321, or graduate student status. Elective. T. Cullen
Concerns managing across cultural boundaries. Develop awareness of the pervasive and hidden influence of culture on behavior, familiarity with the types of situations and issues that often confront managers working in foreign countries, and an appreciation of the impact on personal behavior of living and working in another culture.

H ADM 701 Competitive Strategies for the Hospitality Industry
Fall. 3 credits. Professional master's requirement. T. Cullen
An integration and application of management concepts, theories, and practices to business situations. Students analyze current problems, formulate strategies, and implement policies.

H ADM 702 Human Behavior in Organizations
Fall. 3 credits. Professional master's requirement. T. Hinkin
An integration of theory and application, designed to increase interpersonal and managerial effectiveness. Emphasis on personality and perception, decision making, motivation, power, group process, and diversity management.

H ADM 801 Seminar in Hospitality and Service Inquiry
Fall. 3 credits. Elective. Not offered 1995–96; next offered fall 1996.
This seminar introduces academic graduate students to the major alternative ways of conceptualizing and designing research, and acquiring, interpreting, and disseminating data. The implications and consequences of one's choices among the alternative perspectives and approaches will be emphasized.

H ADM 115 Organizational Behavior and Interpersonal Skills
Fall and spring. 3 credits. Required. F. Berger, T. Hinkin, T. Simons
Focuses on managing people in the workplace. Students develop theoretical lenses for understanding people and organizations and practical tools for accomplishing personal and organizational goals. Topics include individual differences, conflict management, problem-solving, power and influence, motivation, leadership, coaching and counseling, and group process. Self-assessments, experiential exercises, reading, discussions, papers, and group activities.

H ADM 210 The Management of Human Resources
Fall. 3 credits. Limited to 100 non–hotel school students, no freshmen. Elective. C. Lundberg
Examines the role of human resources management, starting with an introduction to the personnel function and an analysis of the social, legal, international, and competitive factors. Examines recruitment, selection, training, motivation, development, compensation, performance appraisal, and labor relations. Class discussion and case analysis are emphasized.

H ADM 211 Human Resources Management
Fall and spring. 3 credits. Limited to 40 hotel school students per lecture, no freshmen or graduate students. Prerequisite: H Adm 105 and 115 (co-registration in 115 allowed). Required. M. Fulford, B. Tracey.
Provides students with an overview of the human resources management (hrm) field and shows them the link between specific hrm activities and substantive issues. Evaluations they will face as future hospitality managers. Integrates information and knowledge acquired in previous courses into the field of hrm. Students will understand the relationship between compensation and benefit activities and job design, motivation, and reward.
structures. Upon completion, students should a) understand the relationship among HR activities, as well as the relationship between HR and other functional areas within hospitality organizations; and b) understand how to effectively attract, retain, and motivate hospitality employees.

**H ADM 313 Training in the Hospitality Industry**
Fall. 3 credits. Limited to 24 students. Prerequisite: H ADM 211. Elective. B. Tracy.
Training is one of the primary activities for coping with a continuously changing environment. It is also one of the fundamental responsibilities of all hospitality managers. Students will learn the major theoretical and practical issues associated with program design, development, implementation, and evaluation. Semester-long project with one or more hospitality organizations.

**H ADM 412 Managing Organizational Change**
Spring. 3 credits. Prerequisite: H ADM 313 or equivalent. Elective. C. Lundberg. Facilitating and managing change in organizations. Topics include change processes, organizational diagnosis, action planning, and consultancy. Individual and team projects.

**H ADM 414 Leadership and Small Group Processes**
Fall. 3 credits. Limited to 30 hotel school juniors, seniors, and graduate students. Elective. C. Lundberg. Applications of organizational behavior will be explored through lectures, case studies, and management games and exercises. Students will participate in experiential labs aimed at enhancing their effectiveness as members or leaders of groups. Topics include leadership, decision making, motivation, power, and organizational change.

**H ADM 415 Managerial Leadership in the 1990s**
Students become participant observers in their own lives through studying the field of applied behavioral science. Students will be able to use what they learn about human beings and how they function best in groups and organizations on a day-to-day basis to develop quality relationships between themselves and the people they support and depend upon (boss, staff, internal peers/associates and customers). Because of the popularity of this class, priority will be given in the following order: seniors, juniors, non-employee extramural students, sophomores, freshmen, and Cornell employees. Space permitting, the class may be added up to the first day, but the absolute deadline for dropping the course is 3:00 p.m. on the Monday immediately preceding the first class day.

**H ADM 416 Special Studies in the Management of Human Resources: Service Cultures**
Spring. 3 credits. Limited to juniors, seniors and graduate students. Prerequisite: H ADM 211 or equivalent. Elective. Not offered 1995-96; next offered spring 1997.
Emphasis on design and development of human resource initiatives to achieve strong service cultures and improve organizational performance. Topics include management of emotions, monitoring and measuring corporate culture, and linkage of human resource practices to service vision, organizational design, and strategic objectives. Students will develop a culture audit in a business. Class discussion, case analysis, and field experience.

**H ADM 711 Human Resources Management**
Spring. 3 credits. Professional master's requirement. C. Lundberg. Focuses on the development of human resources management skills and exploration of the dilemmas and responsibilities of leadership. Uses managerial perspective with emphasis on the effects that managerial activities have on recruitment, selection, and retention systems. Individual decision-making and integration abilities will be assessed. Case studies, exercises, and simulations.

**FINANCIAL MANAGEMENT COURSES**

**H ADM 120 Survey of Financial Management**
Spring. 2 credits. Limited to non-hotel school students. Elective. A. Arbel. A survey of basic principles of financial management, investment management, and financial analysis. Designed for the student who desires a basic general knowledge of financial decision making.

**H ADM 121 Financial Accounting**
Spring. 3 credits. Limited to hotel school students. Required. D. Ferguson. The basic principles of accounting, involving transaction analysis, flow of accounting data to the financial statements, and careful consideration of accounting for revenues, expenses, assets, liabilities, and owner's equity.

**H ADM 122 Finance**
Fall and spring. 3 credits. Limited to non-hotel school students. Elective. A. Arbel. Corporate finance topics include time value of money, financial markets, interest rates, financial statement analysis and planning, working capital policy and management, risk and return, risk management, valuation models, cost of capital, capital budgeting, capital structure, dividend policy, and creative finance.

**H ADM 211 Managerial Accounting**
Fall. 3 credits. Prerequisites: H ADM 121 and 175, or equivalents. Required. G. Potter. Emphasis on the managerial use of financial accounting information, including the analysis of business operations to gain a perspective on how outsiders evaluate management's performance. Also, extracts, develops, and analyzes data to support managerial decision making.

**H ADM 222 Finance**
Spring. 3 credits. Prerequisite: H ADM 121, 221, or equivalents. Required. S. Carvell. Emphasis on the managerial use of financial accounting information for financial planning, financial decision making, and capital budgeting evaluation and short-term and long-term financial decision making. Topics include current asset management, short-term financing, capital budgeting, long-term financing, cost of capital, and problems in international finance.

**H ADM 321 Hospitality Financial Management**
Fall. 3 credits. Prerequisites: H ADM 121, 221 and 222, or permission of instructor. Required. L. Canira, D. Ferguson. Integrates the areas of financial accounting, managerial accounting, and finance and applies the interpretive and analytical skills of each to hospitality-industry situations. Topics include uniform system of accounts, revenue and expense tracking, and internal control, accounting systems, ratio and comparative analysis, cost-volume-profit analysis, pricing, operational budgeting, project capital budgeting, decision-making, equity and debt financing structures, and operating agreement forms. Students analyze hospitality operations and projects and present their findings in management report form.

**H ADM 322 Investment Management**
Fall and spring. 3 credits. Limited to juniors, seniors, and graduate students. Elective. A. Arbel. Covers institutional and analytical aspects of security analysis and investment management: securities markets, sources of investment information, risk-return analysis, bond and stock valuation, behavior of security prices, portfolio analysis, asset allocation, and portfolio management. Covers the capital asset pricing model, generic stock investment strategy, and the screen-to-profile approach and their practical implementation for security analysis and investment management. Computer-assisted analysis in which students participate in an investment game. No previous knowledge of computers is required.

**H ADM 323 Hospitality Real-Estate Finance**
Spring. 3 credits. Limited to juniors and seniors. Prerequisite: H ADM 321, or equivalent. Elective. J. Corgel, J. de Roos. Focuses on real estate financing for hospitality-oriented projects. Topics include methods of measuring rates of return, feasibility and appraisal processes, equity and debt financing vehicles to include joint ventures, limited partnerships, construction mortgages, participating, convertible, and seller-financed mortgages, forms of operating agreements to include management contracts, leases, and franchises; workout strategies for distressed properties; trends in international hotel franchising; and ethical issues of real estate development. Presentations of hospitality industry real estate practitioners.

**H ADM 324 International Financial Management**
Fall. 3 credits. Prerequisites: H ADM 121, 221, 222, or equivalents, micro and macroeconomics. Elective. D. Ferguson. Focuses on the international aspects of financial management and the hospitality industry with the intention of providing an understanding of and confidence.
in dealing with the economic issues faced by the multinational corporation. Areas covered are the international financial management environment, the management of foreign exchange risk, international asset management, and international sources of funds.

**H ADM 326 Corporate Finance**
Fall. 3 credits. Limited to juniors and seniors. Prerequisite: H ADM 321. Elective. S. Carvell.

In-depth analysis of corporate financial management, including financing alternatives and capital structure decisions, cash management, capital budgeting decisions, risk analysis, and working capital management. Although applicable to all businesses, special attention is placed on issues important to the hospitality industry. Emphasizes analytical methods through case studies and an in-depth semester project.

**H ADM 328 Advanced Hospitality Managerial Accounting**
Fall. 3 credits. Prerequisites: H ADM 121, 221, 222, and 321, or equivalents. Elective. Not offered 1995–96; next offered fall 1996.

Emphasis is on the use of accounting information for managerial planning, control, analysis, and evaluation. The coverage will include managerial accounting, cost allocation, management control, models for decision making, and the special topics of joint products, transfer pricing, responsibility accounting, and performance measurement. Explores the application of managerial accounting concepts to the hospitality industry. Case studies.

**H ADM 421 Internal Control in Hospitality Operations**
Fall. 3 credits. Limited to 30 students. Prerequisite: H ADM 321, 722, or equivalents. Elective. N. Geller.

Hotel and restaurant operations are analyzed from the perspective of preventing fraud and embezzlement. The design and distribution of production, accounting, information systems, and supervisory tasks are studied in a manner that will ensure effective internal control and verifiable audit trails. Case studies.

**H ADM 422 Taxation and Management Decisions**
Fall. 3 credits. Limited to 50 juniors, seniors and graduate students. Elective. A. Sciarabba.

Introduction to tax advantages and disadvantages of various organizational structures, including corporations, partnerships, and subchapter "S" corporations; financial information reporting to tax authorities and shareholders and how they differ; use of depreciation methods to achieve tax reductions; syndication techniques; and the role tax laws play in promoting private investment and development.

**H ADM 423 Financial Management Policy**
Fall. 3 credits. Limited to 30 students; non-hotel students by permission of instructor. Prerequisite: H ADM 326 or 721. Elective. S. Carvell.

Covers numerous policy issues in financial management. Each of these issues will affect the potential profitability and survivability of the firm, under conditions of uncertainty. The course will concentrate on nine major policy issues including capital structure, dividend policy, lease vs. buy analysis, and working capital financing.

**H ADM 621 Hospitality Real Estate Finance**
Spring. 3 credits. Limited to graduate students. Prerequisite: H ADM 722, or equivalent. Elective. J. Corgel, J. deRoos.

For description, see H ADM 323. This graduate course includes the H ADM 323 lectures plus an hour-long discussion session each week which features guest speakers from industry, faculty from other colleges, and case studies.

**H ADM 624 Analysis and Interpretation of Financial Statements**
Spring. 3 credits. Limited to seniors and graduate students. Elective. G. Potter.

Covers the financial accounting issues that are encountered in reporting the operations of corporate enterprises. Emphasis is on the components of financial statements, how and why they are reported, and their impact on the overall financial position of the firm and its acceptance in capital markets. Emphasis is on outsiders' views of the company and their decision making through interpretation of the statements.

**H ADM 721 Financial Economics**
Fall. 3 credits. Professional master's requirement. L. Canina.

Integrates corporate finance with the framework of value minimization and the competitive analysis of product and factor markets in the hospitality industry. Topics include short-term asset management, strategic valuation, capital budgeting analysis, capital structure decisions, leasing, and international financial management.

**H ADM 722 Hospitality Financial Management**
Spring. 3 credits. Professional master's requirement. N. Geller.

Covers both managerial accounting and financial management as they are practiced in the hospitality industry. Topics include hospitality accounting systems and internal control, financial statement analysis and interpretation, operational analysis, cost behavior, budgeting and forecasting, pricing, and feasibility analysis.

**FOOD AND BEVERAGE MANAGEMENT COURSES**

**H ADM 136 Food and Beverage Management**
Fall and spring. 4 credits. Limited to hotel school students. Required. G. Norkus.

An introduction to the principles of food and beverage management, beginning with an overview of the food service industry at large. Attention is focused on major industry segments, business practices, and trends. Detailed consideration is given to the components of the food service system: marketing, menu planning, logistical support, production, service, controls, and quality assurance. Product and systems differentiation in various industry segments are emphasized.

**H ADM 330 Seminar in Chain-Restaurant Operations**
Spring. 3 credits. Prerequisite: H ADM 136, or permission of instructor. Elective. C. Muller, G. Norkus.

A chain-affiliated restaurants account for an ever-increasing market share of all food service dollars. The growth of multi-unit chain operations brings out unique challenges, opportunities, and strategic orientations for restaurant management. This course will identify these present issues, the historical factors that have led to them, and the pending economic and organizational questions facing the chain restaurant segment. Case study analyses, company research, and a term project.

**H ADM 331 Food Service Distribution Management**
Fall. 3 credits. Limited to 24 juniors, seniors, and graduate students; others by permission of instructor. Elective. E. Meiberg.

Designed to acquaint the student with the food service distribution industry. Analyzes the history and origins of the food service distribution industry, the distributor's role in supporting the operations of the restaurant industry, and the specific disciplines of food service distribution.

Studies of food groups, their respective methods of preparation, cooking, presentation, and holding. Designed for non-hotel students who are interested in learning the professional approach to food preparation and service with hands-on practice. Food product identification, preparation and service methods, and professional language of food and cooking.
Topics include flavor marriages, garnishes, principles of organoleptical food evaluation. An advanced course covering finer points of requirements for success of each of the line and marketing perspective will be taken using cooking and baking. A culinary, chemical, students become familiar with the various growth. The laboratory is based on a hands-markets, and planning for organization full-service restaurant operation. Topics include wine list development, special event promotion, on-premise merchandising, and hands-on experience in Statler restaurants in carrying out nutritionally aware or "spa-designed" food concept.

Elective: S. Mutkoski, A. Nash.

H ADM 434 Desserts Merchandising
Spring. 3 credits. Field trips, $100. Limited to 25 students. Prerequisites: H Adm 136 and 236. Elective. T. O'Connor. Designed to explore and analyze food service management in business, industry, and health-care facilities, e.g., office/industrial complexes, educational institutions, contract companies, and hospital and extended-care facilities. Characteristics of food service organization structures, job descriptions, controls, systems design, equipment, and government/legal regulations. Readings, small investigative projects, discussions, local site visits, and one field trip to a metropolitan area.

H ADM 435 Selection, Procurement, and Supply Management
Fall. 3 credits. Prerequisite: H Adm 136 or 731. Elective. G. Norkus, R. Spies. Expands upon the concepts of purchasing and supply management that were developed in H ADM 136 and 731. Designed to expose the student to two specific areas: the management of the procurement process and the major commodity groups that are germane to the operation of a hotel or foodservice operation. Lectures include discussions on the comparison of the purchasing function in the hospitality industry to other industries, distribution systems, legal and ethical implications in buyer-seller relationships, procurement options, buying strategy.
HOTEL ADMINISTRATION - 1995–1996

MARKETING AND TOURISM

H ADM 240 Marketing Principles
Fall and spring. 3 credits. Limited to non-
hotelschool students. Faculty.
An introductory course providing a basic
understanding of consumer purchase decision
making, product planning, distribution,
promotion, and pricing. Companies and their
current marketing strategies will be examined
to better understand these fundamental tenets
of marketing and how they contribute to the
crucial process of strategic planning.

H ADM 241 Marketing Principles
Fall and spring. 4 credits. Limited to non-
hotelschool students. Elective. Faculty.
For description, see H ADM 240. This course
includes the H Adm 240 lectures plus section
activities.

H ADM 243 Marketing Management for
the Hospitality Industry
Fall and spring. 3 credits. Limited to 120
hotelschool students. Not open to
freshmen. Required. R. Bell.
Provides an overview of the discipline of
marketing as it applies to the hospitality
industry. Topics include understanding how a
marketing strategy is devised, especially the
interrelationship of company objectives,
internal resources, the external operating
environment, and how the special nature of
service affects the development of marketing
strategies in the hospitality industry.

H ADM 244 Tourism I
Fall and spring. 3 credits. Not open to
An introductory course in the study of
tourism. The origins and evolution of
temporary tourism are examined. Students
are familiarized with the various supply
components of the tourism industrial base and
their integration on an international scale.
The effects of mass-volume tourist demand on
destination development are explored through
the use of selected limited case studies. Guest
lectures highlight the economic operations
and effects of tourism in both the public and
private sectors.

H ADM 245 The Basics of Hotel Sales
Spring. 3 credits. Field trip, $50. Limited
to 30 students. Prerequisite: H Adm 240/
241/243, 741, or equivalent. Elective. R. Bell.
Emphasis on skills and knowledge leading to
an understanding of the role of a successful
property level sales person. Topics include
roles of types of sales positions at the hotel
level, tools necessary to make it up the ladder,
operation of a hotel sales function, and
differing buying strategies of market segments.

H ADM 343 Marketing Research
Fall and spring. 3 credits. Limited to
seniors. Prerequisites: principles of
marketing or marketing management and
introductory quantitative methods.
Elective. M. Morgan.
Introduces students to the use of marketing
research methods in gathering and analyzing
the information needed to make marketing
management decisions. Focuses primarily on
service industries.

H ADM 346 Marketing Planning for
Hotels
Fall. 3 credits. Prerequisite: H Adm 243,
741, or equivalent. Elective. R. Bell.
Key variables in property level management
and their proper application in developing a
marketing plan, e.g., marketing intelligence,
demand analysis, supply and competitor
analysis, segment analysis, resource allocation,
sales strategies and measurement of results.

H ADM 347 Consumer Behavior
Fall and spring. 3 credits. Limited to
seniors. Prerequisite: a principles of
marketing or marketing management
course. Elective. Faculty.
Introduces students to the dynamic interactions
among affect, cognition, behaviors, and
environmental events that are involved in
market exchanges. Covers information
processing, behavior management, and market
segmentation and positioning as well as using
the consumer behavior concepts and
principles in the development of marketing
strategies.

H ADM 442 Marketing Communications
Spring. 3 credits. Prerequisite: a previous
marketing course. Elective. Not offered 1995–96; next
offered spring 1997.
Provides students with a managerial
understanding of the effective use of a variety of
marketing communication media, including
advertising, sales promotion, public relations,
direct marketing and out-of-home. Hospitality
industry emphasized.

H ADM 444 Tourism II
Spring. 3 credits. Limited to juniors,
seniors, and graduate students. Prerequi-
tites: H Adm 243, 244, or equivalents or
written permission of instructor. Elective.
M. Noden.
An advanced course in the study of tourism.
Emphasis is placed on the development of
the tourism industrial base and development
and financing of superstructure and infrastructure.
Econometric model development for demand
predictions is examined and analyzed.
Students are expected to engage in a wide
range of discussion and analysis of the effects
of tourism on various environments in social
and economic terms. Case studies, occasional
guest lectures.

H ADM 445 Services Marketing
Fall and spring. Not offered fall 1995; next
offered spring 1996. 3 credits. Limited to
undergraduate students. Prerequisite: a
previous marketing course or permission
of instructor. Elective. L. Renaghan.
Students preparing for ownership or manage-
ment positions will develop an understanding of
services marketing principles applicable
across the entire services sector. Topics will
include marketing strategies of service firms,
new marketing approaches, and the reformula-
tion of traditional marketing principles from
consumers and industrial goods marketing.
Four case studies, guest speakers.

H ADM 449 International Marketing
Fall. 3 credits. Limited to 25 students.
Prerequisites: Micro and macroeconomics.
Elective. Not offered 1995–96; next
offered fall 1996.
Develops understanding of international
marketing with emphasis on hospitality-
industry applications. Focuses on the
similarities and differences that exist between
domestic and international marketing and the
conduct of international marketing in various
segments of the world.
H ADM 641 Marketing Decision Models for Service Firms
Spring. 3 credits. Limited to seniors and graduate students. Prerequisite: a principles of marketing or marketing management course and an introductory course in quantitative methods. Elective. M. Morgan.
Introduces students to the use of marketing and consumer decision models in making marketing management decisions. Focuses on current services marketing problems.

H ADM 642 Strategic Marketing
Fall. 3 credits. Limited to graduate students. Prerequisite: a marketing course, or permission of instructor. Elective. Not offered 1995–96; next offered fall 1996.
Offers theoretical and practical approaches to addressing strategic marketing challenges in hospitality and service firms. Strategic marketing concepts and principles will be learned through lectures, discussion, and development of a strategic marketing report.

H ADM 643 Marketing Research
Fall and spring. 3 credits. Limited to graduate students. Prerequisites: principles of marketing or marketing management and an introductory course in quantitative methods. Elective. M. Morgan.
Introduces students to the use of marketing research methods in gathering and analyzing the information needed to make marketing management decisions. Focuses primarily on service industries.

H ADM 644 Food and Beverage Marketing/Strategy
Fall. 3 credits. Limited to seniors by permission and graduate students. Prerequisite: prior three-credit marketing course. Elective. T. Kelly, L. Renaghan.
Focuses on how to apply marketing, sales, and merchandising techniques to the commercial food and beverage industry. Addresses developing a market segmentation based upon understanding the needs and wants of potential target markets, translating needs and wants into viable food service concept positioning strategy, and marketing strategies used to maintain and increase sales and market share. Recitation and analysis involves substantial use of the Consumer Report on Eating Share Trends (CREST) database.

H ADM 645 Services Marketing
Fall and spring. Not offered fall 1995; next offered spring 1996. 3 credits. Limited to graduate students. Prerequisite: previous marketing course, or permission of instructor. Elective. L. Renaghan.
For description, see H ADM 445. This course includes the H ADM 445 lectures plus three case studies and a research paper.

H ADM 646 Marketing Planning For Hotels
Fall. 3 credits. Limited to graduate students. Prerequisite: H ADM 243, 741, or equivalent. Elective. R. Bell.
For description, see 346. This course includes the H ADM 346 lectures plus a theoretical paper.

H ADM 647 Consumer Behavior
Fall. 3 credits. Limited to graduate students. Prerequisite: introductory marketing principles or marketing management course. Elective. Faculty.
For description, see 347.

H ADM 741 Marketing Management
Spring. 3 credits. Professional master’s requirement. R. Bell.
Basic concepts and principles underlying marketing decision making and the skills needed to analyze and understand complex marketing situations in order to plan and implement marketing programs.

PROPERTY ASSET MANAGEMENT COURSES

H ADM 255 Hotel Development and Planning
Spring. 3 credits. Limited to sophomores, juniors, and seniors. Required. J. deRoos.
An introduction and management overview of the problems and opportunities inherent in the development and planning of hospitality facilities. Topics include the project development sequence; conceptual and space planning; architectural design criteria, construction management, and the interpretation of architectural design and consultant drawings. Emphasis is on setting appropriate facilities requirements, understanding industry practice, and implementing properties decisions within a balanced design, operations, and financial framework.

H ADM 350 Real Estate Management
Fall. 3 credits. Elective. J. deRoos.
Designed for students interested in the management of residential and commercial real estate. Overview of real estate economics, the relevant law, and different aspects of property management including leases and management contracts, accounting and finance, staffing and operations. Examples from several types of properties.

H ADM 351 Hospitality Facilities Design
Fall. 4 credits. Prerequisite: H ADM 255 or 751 or permission of instructor. Elective. S. Robson.
A studio course dealing with property development, planning, and design by focusing on the design and analysis of hotel plans. Students learn basic graphic techniques and apply them to planning problems for hospitality facilities. Final project.

H ADM 352 Hotel Planning and Interior Design
A project course concerned with hotel planning, interior design, and renovation. Students establish the operator's criteria for the renovation of hotel guestrooms and public areas, prepare budgets, and develop preliminary conceptual designs leading to a substantial graphic presentation. Drawing ability is essential.

H ADM 353 Food Service Facilities Design
Spring. 3 credits. Limited to 15 students. Prerequisites: H ADM 351 and 335 (co-registration is allowed) or food service experience is recommended. Elective. S. Robson.
An introduction to the basic concepts of food service facilities design and planning. Students will determine space allocations for kitchens and their support areas; develop basic production work flow in the preparation and service areas; and select equipment utilizing standards for production capability, quality of construction, and ease of maintenance. Students will use studio time for planning, designing, and writing specifications for a medium-size restaurant kitchen.

H ADM 354 Computer-Aided Design
Fall and spring. 2 credits. Limited to 18 students per lecture. Prerequisite: H ADM 351 or equivalent studio experience. Attendance at first class is mandatory. Elective. S. Robson.
The operation of computer-aided design (CAD) systems. Using AutoCAD on the IBM PC, the course presents an organized and logical sequence of commands, mode settings, drawing aids, and other characteristics of CAD. Students will learn the program in the school’s computer center and will develop a complete graphic presentation. Emphasis is on the use and operation of CAD systems in a commercial document production environment.

H ADM 355 Hospitality Facilities Operations
Fall. 3 credits. Prerequisite: H ADM 255. Required. D. Stipanuk.
An overview of the operation of hospitality facilities, including operating costs for various types of facilities, types and characteristics of major building systems, and the responsibilities of the engineering-maintenance departments. The renovation needs of hospitality facilities are examined and key managerial aspects of renovations considered.

H ADM 356 Hospitality Risk Management
Spring. 3 credits. Limited to 30 hotel school juniors, seniors and graduate students. Elective. D. Stipanuk.
Risk management within the hospitality environment as applied to issues of control and risk financing. Issues in fire protection, customer and workplace safety, OSHA requirements, and customer and corporate security are analyzed. Basic elements of insurance and crisis management are discussed.

H ADM 357 Insurance and Risk Management
Fall and spring. 3 credits. Limited to 75 students per lecture. Prerequisite: an introductory accounting or business course. Elective. Faculty.
A comprehensive look at risk management within a general business or institutional environment. Reviews insurance and non-insurance solutions to controlling loss, the general legal environment within which risk management processes work, and the integration of crisis management into the overall corporate risk management plan.

H ADM 450 Principles of Real Estate
Fall. 3 credits. Limited to juniors and seniors. Elective. Faculty.
Approaches real estate from four perspectives: legal, economic, financial, and business. Understanding these perspectives will enable students to make better investment and financing decisions, to use real estate resources wisely, to understand property rights, and to be prepared for additional courses in real estate investment, finance, and development.
H ADM 455 Special Topics in Properties Management  
Fall and spring. 2 credits. Limited to seniors and graduate students. Elective. Not offered 1995–96; next offered 1996–97. The theme and instructor of the "special topics" course will change each year on the basis of current trends, student interest, and faculty expertise. See the school registrar or the properties area coordinator for details about the current topics.

H ADM 456 Hospitality Facilities Management  
Spring. 3 credits. Prerequisite: H Adm 355, 751, or permission of the instructor. Elective. D. Stipanuk. Examines building engineering systems and the management of physical facilities in the hospitality industry, including the organization of the maintenance and engineering functions. Includes visits to other campus buildings to survey their engineering systems.

H ADM 457 Advanced Development and Construction  
Fall. 3 credits. Limited to seniors and graduate students. Elective. Not offered 1995–96; next offered fall 1996. Focuses on the management structure and systems, laws, regulations, and industry practices that most influence the successful development of commercial and residential real estate, including lodging and eating facilities. Topics include scheduling, budgeting, marketing, and public policy issues. Guest lecturers, case studies, and group project.

H ADM 458 Hospitality Real Estate  
Spring. 3 credits. Prerequisite: H Adm 323, 450, or permission of instructor. Elective. J. Corgel. Expands the student's understanding of the role of real estate in individual hospitality businesses and corporations. Designed for those who plan careers in the hospitality industry. Specific objectives are to develop an appreciation of real estate as a factor in the production of income of hospitality businesses; to develop an appreciation of real estate as an asset that can be managed, sold, and otherwise used to increase the wealth of hospitality corporation shareholders; and to understand the importance of valuing real estate, gain working knowledge of valuation approaches, and be aware of contemporary hospitality valuation issues.

H ADM 459 International Development  
Fall. 3 credits. Limited to seniors and graduate students. Elective. J. Clark. Seminar covering the strategic development of international hospitality projects. Topics include corporate expansion strategies, the international development process, viewpoints of public and private stakeholders, technology infrastructure, environmental concerns, and public policy issues. Guest lecturers.

H ADM 651 Principles of Real Estate  
Fall. 3 credits. Limited to graduate students. Elective. J. deRoo. For description, see H ADM 450. This course includes the H Adm 450 lectures plus an hour-long lecture once each week featuring guest speakers from industry, faculty from other colleges, and case studies. Comprehensive term project.

H ADM 658 Advanced Real Estate  
Spring. 3 credits. Prerequisite: H Adm 323, 450 or 651. Elective. J. Corgel. Promotes sound real estate investment and finance decision making through the use of advanced theory and techniques in financial economics. Real estate investment decisions are made through applications of the after-tax discounted cash flow model which incorporates prevailing domestic and international economic conditions in real estate markets, tax rules, and government regulations. Financing decisions are made using the techniques of modern financial analysis. Widespread array of financing options is considered including convertible, participating, and accrual mortgages. All types of residential and non-residential real estate are analyzed; however, special emphasis is placed on the analysis of hospitality properties.

H ADM 751 Properties Development and Planning  
Spring. 3 credits. Professional master's requirement. R. Penner. The major elements of physical asset-development. Topics include the role of the real estate asset in the hospitality firm, the development process, hotel planning and design, and construction management principles.

COMMUNICATION COURSES

H ADM 165 Managerial Communication I  
Fall and spring. 3 credits. Elective. J. Corgel. Each lecture limited to 18 students. Note: Students required to take this course generally may not delay it. If extenuating circumstances exist, student must petition to drop the course by the end of the first week of classes. Prerequisites: Hotel Adm 165 and 115. Students may not take this course concurrently with H Adm 335. Required. B. Stevens, E. Huettman, S. Kiner. A broad study of communication in a management context. Emphasizes the significant role of communication in developing work relationships that enable managers to achieve their goals. Presents the theories and principles of communication that underlie effective performance. Students increase their individual communication abilities by applying these concepts in a variety of managerial contexts, including interacting one-to-one, working in groups, and formally developing and presenting ideas to larger audiences.

H ADM 462 Communication and the Multicultural Organization  
Fall. 3 credits. Elective. E. Huettman. Influence of culture, perception, and gender on communication in multicultural organizations, including international and domestic businesses with diverse work forces. Focus is on human interaction at work. Special emphasis on hospitality industry. Topics include values and beliefs, how race and gender affect language use, cultural differences in nonverbal communication, ethnocentrism and stereotyping, intercultural sensitivity and adjustment, cultural variables, persuasion, and ethics of communication in international business.

H ADM 463 Persuasive Communication in Organizations  
Spring. 3 credits. Limited to 18 students. Prerequisites: H Adm 165 and 355 for hotel school undergraduates, or permission of instructor. Elective. Not offered 1995–96; next offered spring 1997. Prepares students to communicate effectively in a variety of persuasive speaking contexts. Principles of persuasion will be thoroughly examined as they apply to managerial communication tasks. Emphasis on persuasive speaking; also relationship between written and oral communication. Students the principles of persuasion, analyzes case studies in the hospitality industry, and applies persuasive strategies in simulated workplace settings.)
H ADM 661 Organizational Communication For Managers
Spring. 3 credits. Elective. B. Stevens. Focuses on the complex interactions that occur when people communicate in organizations. Structured around the communication tasks managers must accomplish to be effective on the job. Business cases. Emphasis on design of effective communication strategies. Applications and experiential exercises help students perfect their ability to write, make oral presentations, and interact effectively with others in managerial contexts.

H ADM 761 Communication Modules for Master's Students
Year-long course. Variable credits. S-U grades only. Elective. J. Brownell, D. Jameson. A variety of elective modules, generally ranging from two to six contact hours, covering topics related to the professional master's program benchmarks (see H Adm 794). Additional topics may be offered. Provides maximum flexibility, and focused topics include organizing ideas, listening, and revising and editing written documents. Modules available on a first-come, first-served basis, offered throughout the semester during the management development periods.

OPERATIONS MANAGEMENT, INFORMATION TECHNOLOGY COURSES

H ADM 170 Keyboarding on the Macintosh
Spring. 2 credits. Limited to 30 students. Elective. B. David. An introduction to the computer and a beginning course in alphabetic and numeric keyboarding. Students learn word-processing skills during the second half of the course.

H ADM 174 Microcomputing
Fall. 3 credits. Limited to hotel school freshmen. Spring and summer. 3 credits. Open enrollment. Maximum of 30 students per lecture. Required. R. Alvarez, B. David, R. Moore. An introduction to microcomputing to develop functional computer fluency. Students develop skills in five generic areas: text, graphics, spreadsheet, presentation, and list processing. The course is entirely lab-oriented and students work primarily on Macintosh personal computers with secondary drill work on IBM personal computers.

H ADM 175 Quantitative Methods
Fall and spring. 3 credits. Limited to 120 students. Corequisite: H Adm 174. Required. Faculty. An introduction to statistical and operations management methods appropriate to the hospitality industry. Topics include descriptive statistics, probability, correlation and regression, forecasting, decision analysis, quality control charts, and an introduction to yield management. Emphasis is on practical applications of the techniques to hospitality related problems.

H ADM 374 End-User Business Computing Tools
Spring. 3 credits. Limited to 20 students per lecture. Elective. R. Alvarez. Explores the personal computer as a managerial tool. Concepts of spreadsheet modeling, database, and end-user computing are covered. Students learn to use specific software applications programs to solve original problems. All work is done on IBM computers.

H ADM 375 Hotel Computing Applications
Spring. 3 credits. Prerequisite: H Adm 174 or equivalent. Elective. R. Moore. Introduces students from a management perspective to technology-based systems used in the hospitality industry which enhance guest service and support management decision making. Topics include following systems: global distribution, yield management, property-management, communication networks (LANS and WANS); and food service management. Experience on systems widely used in hospitality industry and develops IBM PC knowledge and skills.

H ADM 474 Corporate Information Systems Management
Spring. 3 credits. Limited to juniors, seniors, and graduate students who have not taken H Adm 772. Elective. R. Alvarez. Explores ten key issues in information technology management through use of case studies of companies with relevant experience with the issues. A basic understanding of information technology, organizational behavior, and general management is advised.

H ADM 674 Service Operations Management
Spring. 3 credits. Limited to 25 graduate students. Prerequisite: H Adm 775 or equivalent. Elective. S. Kimes. The objective of this course is to improve the understanding of the operations function of service organizations. Focuses on the role and nature of service operations, the relationship of operations to other business functions, and develops skills and provides techniques for the effective management of service operations. Topics include service design, bottleneck and layout analysis, capacity management, work force management, and quality management. Intended for graduate students interested in service management.

H ADM 771 Graduate Quantitative Methods
Fall. 3 credits. Professional master's requirement. S. Kimes. Explores the framework for decision making, descriptive statistics, probability, forecasting, decision analysis, and optimization.

H ADM 772 Information Technology for Hospitality Managers
Fall. 3 credits. Professional master's requirement. R. Moore. Familiarizes students with issues surrounding the use of information technology in supporting hospitality operations from a guest services perspective and decision making from the viewpoint of management.

H ADM 385 Business Law I
Fall and spring. 3 credits. Limited to juniors, seniors, and graduate students outside the hotel school, and hotel students by permission of the instructor. Elective. J. Sherry. Designed to enable students to acquire a basic understanding of law and legal relationships in a business context. Variety of topics aid in making decisions as an executive with managerial responsibilities.

H ADM 387 Business and Hospitality Law
Fall and spring. 3 credits. Limited to juniors, seniors, and graduate students. Required. J. Sherry. An integrated, chronological presentation of contract, agency, and tort concepts as they apply to the legal aspects of hospitality management. Appropriate federal, state, and local cases, statutes, and other materials are examined. The overall objective is to recognize, analyze, and evaluate legal issues for the purpose of making and articulating appropriate decisions.

H ADM 487 Real Estate Law
Fall and spring. 3 credits. Recommended: completion of H Adm 387 or equivalent. Elective. J. Sherry. Familiarizes students with the nature and ownership of real estate. Describes interests in real estate and how title is transferred. Acquaints students with legal aspects of marketing residential and commercial real estate, including shopping center and commercial leases, real estate syndication, and subdividing real estate for development.

H ADM 681 The Interplay of Law and Ethics in Service Industry Management
Spring. 3 credits. Limited to 50 hotel graduate students; seniors and other graduate students by permission of instructor. Prerequisite: completion of all required professional master's first-year courses, or permission of instructor. Elective. J. Sherry. Involves students in ethical aspects of traditional law problems confronting service industry managers and executives within the areas of commerce, consumerism, administrative law and practice, regulation of anti-competitive marketing activities, and federal securities regulation. The impact of the corporation on traditional notions of personal social responsibility will be stressed.

LAW COURSES

H ADM 385 Business Law I
Spring. 3 credits. Limited to juniors, seniors, and graduate students outside the hotel school, and hotel students by permission of the instructor. Elective. J. Sherry. Designed to enable students to acquire a basic understanding of law and legal relationships in a business context. Variety of topics aid in making decisions as an executive with managerial responsibilities.

H ADM 387 Business and Hospitality Law
Fall and spring. 3 credits. Limited to juniors, seniors, and graduate students. Required. J. Sherry. An integrated, chronological presentation of contract, agency, and tort concepts as they apply to the legal aspects of hospitality management. Appropriate federal, state, and local cases, statutes, and other materials are examined. The overall objective is to recognize, analyze, and evaluate legal issues for the purpose of making and articulating appropriate decisions.

H ADM 487 Real Estate Law
Fall and spring. 3 credits. Recommended: completion of H Adm 387 or equivalent. Elective. J. Sherry. Familiarizes students with the nature and ownership of real estate. Describes interests in real estate and how title is transferred. Acquaints students with legal aspects of marketing residential and commercial real estate, including shopping center and commercial leases, real estate syndication, and subdividing real estate for development.

H ADM 681 The Interplay of Law and Ethics in Service Industry Management
Spring. 3 credits. Limited to 50 hotel graduate students; seniors and other graduate students by permission of instructor. Prerequisite: completion of all required professional master's first-year courses, or permission of instructor. Elective. J. Sherry. Involves students in ethical aspects of traditional law problems confronting service industry managers and executives within the areas of commerce, consumerism, administrative law and practice, regulation of anti-competitive marketing activities, and federal securities regulation. The impact of the corporation on traditional notions of personal social responsibility will be stressed.

OTHER COURSES

H ADM 191 Microeconomics for the Service Industries
Fall and spring. 3 credits. Limited to 60 hotel school students per lecture, others by permission of instructor. Required. Faculty. Introduces the basic principles of microeconomics and teaches students how they apply to managers of enterprises associated with the hospitality industry. Emphasis on methods of market segmentation in the service industries, analyzing economic incentives involved in franchise arrangements, and the nature of competition in various segments of the hospitality industry.
H ADM 490 Housing and Feeding the Homeless
Spring: Variable to 4 credits. Limited to juniors and seniors. Elective. T. O’Connor.
 Explores the public and private sector partnerships in addressing the crisis of homelessness. Through lectures, class discussions, research, volunteering, and a field placement practicum, students will explore the economic, social, and political issues of our country’s growing concern with housing and feeding homeless people. Students will study the history of homelessness and the strategies to prevent and alleviate the problem. The components of successful housing programs and food assistance programs will be analyzed.

Students taking the course for four credit hours will, in small groups, work with agencies providing services to homeless persons. They will analyze the agency’s mission, its opportunities and constraints, identify a specific managerial challenge, and formulate an approach and solution to that challenge. This fieldwork will require approximately eight days during the semester.

Students taking the course for three credit hours will research and write a term paper about some aspect of homelessness and volunteer with a service agency twelve hours during the semester.

H ADM 491 Hotel Ezra Cornell
Fall and spring. Variable credit (maximum, 4). Prerequisite: written permission. Elective. G. Pezzoti.

Elective board members of Hotel Ezra Cornell may receive credit for developing, organizing, and managing the April “hotel-for-a-weekend” event.

H ADM 493 Management Intern Program I—Operations
Fall and spring. 6 credits. Limited to hotel school juniors and seniors with approval of the MIP faculty committee. Prerequisites: Students are expected to have completed H ADM 105, 115, 211, 121, 221, 222, 136, 236, 243, 255, 165, and 174.

In addition, completion of the following courses is strongly recommended: H ADM 301, 321, 335, 355, and 365. Additional course work might be required for applicants considering specialized internships. A detailed plan for the completion of all remaining academic requirements must be approved prior to acceptance into the course. Must be taken in conjunction with H ADM 494. S-U grades only, based on six performance evaluations. Elective. R. Chase.

H ADM 494 Management Intern Program II—Academic
Fall and spring. 6 credits. Must be taken in conjunction with H ADM 493. Letter grades only, based on submission of goals and objectives statement, four management reports, journals, debriefing, and oral presentation. Elective. R. Chase.

H ADM 495 Development and Management of Wellness in Business Organizations

Designed to encourage future managers to evaluate the work environment and to enhance opportunities for diverse worker productivity which should increase the corporation’s competitive edge.

H ADM 499 Undergraduate Independent Study
Fall and spring. Variable, to 4 credits. Elective.

Students are afforded an opportunity to pursue independent study projects under the direction of a faculty member. Permission in writing is required prior to course enrollment. Obtain permission form from the Hotel School Student Services Office. Independent study work must be performed in the term for which it is approved, and the usual add/drop policy applies. Retroactive credit for work commenced after an academic term has ended is not allowed.

H ADM 690 Honors Monograph
Year-long course. 4 credits. Limited to professional master’s students who: 1) either have a minimum GPA of 3.7 or are in the top 10 percent of the students in the year group in their first-year professional master’s courses; 2) have given evidence of being a good writer by meeting all components of the written communication benchmark; and 3) obtained the approval of a brief topic proposal from the potential adviser. Elective. Faculty.

A special integrative course for students who write well and desire to explore in depth a topic of mutual interest to them and a faculty adviser of their choice. The approval of a second reader is required for completion of the course. Special recognition of students who complete the course will be made at graduation. Applications available in the Graduate Office, Room 172 Statler.

H ADM 692 Industry Challenges and Trends
Fall. 3 credits. Limited to 20 seniors and graduate students. Elective. J. Clark.

A seminar approach will use readings and case studies to illustrate current challenges and future trends such as globalization and consolidation in the hospitality industry. Case studies and guest speakers. Presentations and final reports.

H ADM 699 Graduate Independent Research
Fall and spring. Credit to be arranged. Elective.

Student must have in mind a project and obtain agreement from an individual faculty member to oversee and direct the study. Permission in writing is required prior to course enrollment. Obtain permission form from the Hotel School Graduate Office, Room 172, Statler.

H ADM 791-792 Creating and Managing for Service Excellence I & II
Fall. 791, spring. 792. 3 credits. Professional master’s requirement. C. Enz, S. Kimes, L. Renaghan.

This year-long course focuses on developing a clear understanding of service quality from multiple perspectives. Assisted by a faculty team from management, marketing, and operations, students will define, diagnose, design, measure, control, and change service quality. Emphasis will be placed on critical decision making and strategic thinking.

H ADM 793 Industry Mentor Program
Wintersession. No credits. S-U grades only. Professional master’s requirement. T. Kelly.

Interaction with a senior hospitality industry executive. Objectives are to give the student an overview of the operating dynamics of a segment of the industry, to provide a realistic awareness of day-to-day life working as an executive in the industry, and to develop an awareness of the skills, level of integration, and other factors required for success.

H ADM 794 Assessment and Benchmarking for Master’s Students

Individualized approach ensuring that all students meet program benchmarks in written communication, presentational speaking, and group process/leadership skills as well as identify and achieve individual goals. Key component is an initial two-day assessment period during which students participate in a variety of structured experiences and receive personal feedback from industry assessors on their communication and leadership behaviors. Assessment and benchmarking will continue throughout the two-year master’s program.

H ADM 890 M.S. Thesis Research
Fall and spring. Credit to be arranged.

H ADM 990 Ph.D. Thesis Research
Fall and spring. Credit to be arranged.

FACULTY ROSTER
Arbel, Avner, Ph.D., New York U. Prof.
Bell, Russell A., Ph.D., Kansas State U. Assoc. Prof.
Berger, Florence, Ph.D., Cornell U. Prof.
Brownell, Judith, Ph.D., Syracuse U. Assoc. Prof.
Canina, Linda, Ph.D., New York U. Asst. Prof.
Carvell, Steven A., Ph.D., SUNY Binghamton. Assoc. Prof.
Chase, Robert M., M.B.A., Cornell U. Prof.
Clark, John J., Jr., Ph.D., Cornell U. Prof.
Corgel, John B., Ph.D., U. of Georgia. Assoc. Prof.
Cullen, Thomas, Ph.D., Cornell U. Assoc. Prof.
David, Betty B., Lecturer
deRooos, Jan A., Ph.D., Cornell U. Asst. Prof.
Dev, Chekitan S., Ph.D., Virginia Polytechnic. Asst. Prof.
Dittman, David A., Ph.D., Ohio State U. Dean and E. M. Statler, Professor.
Enz, Cathy A., Ph.D., Ohio State U. Assoc. Prof.
Eyster, James J., Ph.D., Cornell U. Hospitality Valuation Services Professor of Finance and Real Estate
Ferguson, Dennis H., Ph.D., Cornell U. Assoc. Prof.
Fulford, Mark D., M.S., Auburn U. Asst. Prof.
Geller, A. Neal, Ph.D., Syracuse U. Prof. and Richard J. and Morene Bradley Director of Graduate Studies
Gould, Shelly, B.S., Cornell U. Teaching Support Specialist
Hinkin, Timothy, Ph.D., U. of Florida. Assoc. Prof.
Huetman, Elizabeth, Ph.D., Purdue U. Asst. Prof.
Jameson, Daphne A., Ph.D., U. of Illinois.
  Assoc. Prof.
Katz, Norman, Ph.D., Harvard U. Lecturer
Kelly, Thomas J., M.S., Cornell U. Assoc. Prof.
Kimes, Sheryl E., Ph.D., U. of Texas. Assoc.
  Prof.
Kiner, Susan W., M.A., U. of Illinois. Lecturer
Lang, Barbara, B.S., Cornell U. Lecturer
Lunley, Jane, M.A., Pennsylvania State U.
  Senior Lecturer
Lundberg, Craig C., Ph.D., Cornell U.
  Blanchard Professor of Human-Resources
  Management
  Prof.
Morgan, Michael S., Ph.D., U. of Texas. Asst.
  Prof.
Mueller, Christopher C., M.P.S., Ph.D., Cornell
  U. Asst. Prof.
Mutkoski, Stephen A., Ph.D., Cornell U. Banfi
  Vintners Professor of Wine Education and
  Management
Neuhaus, Thomas W., M.S., U. of Maryland.
  Lecturer
Noden, Malcolm A., Senior Lecturer
Norkus, Gregory X., M.S., Cornell U. Senior
  Lecturer
O'Connor, Therese A., M.S., Elmira College.
  Senior Lecturer
Penner, Richard H., M.S., Cornell U. Prof.
Pezzotti, Giuseppe G. B., B.S., Cornell U.
  Lecturer
Potter, Gordon S., Ph.D., U. of Wisconsin-
  Madison. Assoc. Prof.
Rainsford, Peter, Ph.D., Cornell U. Assoc.
  Prof.
Redlin, Michael H., Ph.D., Cornell U. Assoc.
  Dean and Prof.
Renaghan, Leo M., Ph.D., Pennsylvania State
  U. Assoc. Prof.
Richmond, Bonnie S., M.S., U. of Missouri.
  Senior Lecturer
Ridley, Jane S., B.A., SUNY at Binghamton.
  Teaching Support Specialist
Sherry, John E. H., J.D., Columbia U. Prof.
Simons, Tony L., Ph.D., Northwestern U. Asst.
  Prof.
Spies, Rupert, Studienassessor, Lecturer
Stevens, Betsy, Ph.D., Wayne State U. Asst.
  Prof.
Stupanik, David M., M.S., U. of Wisconsin.
  Assoc. Prof.
Tabacchi, Mary H., Ph.D., Purdue U. Assoc.
  Prof.
Tracey, J. Bruce, Ph.D., SUNY Albany. Asst.
  Prof.
White, Robert, A.O.S., Culinary Institute of
  America. Teaching Support Specialist

Visiting and Other Teaching Staff
Blanchard, Kenneth, Ph.D., Cornell U.
  Visiting Assoc. Prof.
Ferris, J. David, Ph.D., Greenwich U. Visiting
  Lecturer
James, Robert, M.B.A., Pace U. Visiting
  Lecturer
Merberg, Elliot, B.S., New York U. Visiting
  Lecturer
Nash, Abby A., Cornell U. Visiting Lecturer
Robson, Stephani E.A., B.S., Cornell U.
  Visiting Lecturer
Sciarabba, Andrew, B.B.A., St. John Fisher
  College. Visiting Lecturer
Yesawich, Peter C., Ph.D., Cornell U. Visiting
  Assoc. Prof.
COLLEGE OF HUMAN ECOLOGY

ADMINISTRATION
Francille M. Firebaugh, dean
Charles McClintock, associate dean
William Lacy, associate dean; director of Cornell Cooperative Extension
Carol L. Anderson, assistant dean; associate director of Cornell Cooperative Extension
Jennifer Gerner, assistant dean; assistant director, Cornell University Agricultural Experiment Station
Brenda Bricker, director, admissions
Mary Rhodes, college registrar and director, student services

DEGREE PROGRAMS

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DIVISION OF STUDENT SERVICES
Brenda Bricker, director, Office of Admissions
Mary Rhodes, college registrar and director, Office of Student Services

Persons interested in undergraduate study in human ecology should contact the Office of Admissions, 170 Martha Van Rensselaer Hall. Those interested in graduate study should contact the graduate field representative identified among the faculty of each department. Department faculty are listed at the beginning of the course descriptions for each department.

Matriculated students can find assistance with matters of academic credit, graduation requirements, academic advising, career planning and placement, and personal counseling from the Office of Student Services, N101 Martha Van Rensselaer Hall. International students should contact their student counselor in the Office of Student Services.

ACADEMIC PROGRAMS

Majors
Selection of a major begins with selection of career goals. In their freshman and sophomore years, students can explore ways to relate their personal interests and capabilities to their career goals. As a result, they sometimes decide to change their major. The counselor for career development in the Office of Student Services (N101 Martha Van Rensselaer Hall), and resources in the Student Resource Center (N139 MVR) can help students navigate their career exploration process.

Each department offers a major, and within most departmental majors there are specific options. The college also offers two interdepartmental majors. Selecting a major means choosing one option in one department. Although a student may satisfy the requirements of more than one major option, he or she is officially certified to graduate under only one. The college urges students who satisfy more than one major or option to make note of this in the credentials they file in the university's Career Center and to seek recommendations from faculty associated with the options completed. Majors include the following options.

- Consumer Economics and Housing (CEH): The department supervises the department major and the policy analysis major.
- Design and Environmental Analysis (DEA): Interior design, facility planning and management, human environment relations.
- Human Development and Family Studies (HDFS): Does not have separate options. Courses focus on cognitive, social, and personality development, phases of development, and family studies and life course. The department administers an honors program for selected students.
- Human Service Studies (HSS): Does not have separate options. Courses focus on human service environments, programs, and processes. A professional internship and senior seminar are required. Students may meet the requirements of an accredited bachelor's degree program in social work.
- Nutritional Sciences (NS): The division supervises the department major. (By careful planning, students may also meet the minimum academic requirements of The American Dietetic Association.) The division administers an honors program for selected students.
- Textiles and Apparel (TXA): Apparel design, apparel-textile management, fiber science.
changing majors

Because any student's interests and goals may change during the course of his or her college career, the college provides ways for students to change their majors. It is important for a student to discuss a possible change of major with her or his faculty adviser or counselor. If the student decides to make a change, a completed change-of-major form (available from the Office of Student Services, N101 Martha Van Rensselaer Hall) will officially record the change so that a new adviser can be assigned to the student.

students of mature status

The college recognizes that students who interrupted their formal education and are returning to school have needs different from those of younger undergraduates. To facilitate the reintegration of students, defined as those twenty-four years old or older at first matriculation, the college has adopted certain procedures specifically for that group. The counselor for mature students in the Office of Student Services (N101 MVFR) can provide information of interest to mature students.

Mature students are permitted to enroll for as few as 6 credits without petitioning for permission and are also permitted to extend their residency beyond the normal eight terms.

It is highly recommended that mature students contact the director of the Continuing Education Information Service, B20 Day Hall, for information on resources available through that office.

special students

Students eligible for special status are those visiting from other institutions and interested in particular programs in the college; those with a bachelor's degree preparing for graduate study or jobs and careers in human ecology-related fields; or those who have interrupted their education and are considering completing degree programs. Students accepted in the non-degree status of special student may enroll for a maximum of two semesters. During the second semester of attendance, a special student must either apply for admission as a transfer student or plan to terminate studies in the college at the end of the semester.

Special students are expected to take a minimum of 12 credits each semester and to take one-half to two-thirds of their work in the state divisions of the university. Work taken while a special student is classified as a special student may be counted toward the requirements of the bachelor's degree.

empire state students

Occasionally a student who is completing requirements for a degree through the Empire State College program is interested in taking a human ecology course. This can be done by registering through the Division of Summer Session, Extramural Study, and Related Programs, B20 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 Empire State College's notification of cross-registration form number, SA-22, F-031, to verify enrollment in Empire State College. Such students will be charged 25 percent of the standard extramural tuition per credit.

consumer economics and housing

The behavior of people as consumers and family members and their interactions with private markets and public sectors of the economy are increasingly important as the economy becomes more service-based. One result has been an increasing demand from business and government for trained individuals who understand consumers, families, the markets in which they deal, and how public policies affect the markets and through them consumers and families. The demand has been sufficient to elevate salaries for well-trained individuals.

The consumer economics and housing major provides such training. The major combines economics with statistics, sociology, and family resource management to study how consumer markets work, how firms and consumers behave, the role government plays in consumer protection, how functions shift between households and markets as prices, incomes, social values, and legislation change, and how changes in the family affect consumer markets. Students interact with the faculty and with each other both in the classroom and in field-based learning experiences in the Ithaca area, New York City, Washington, or abroad.

Graduates in consumer economics and housing are prepared for a wide variety of consumer- and family-related positions in business and government. The major also provides an excellent foundation for further studies in economics, law, graduate business, and policy analysis.

The consumer economics and housing major is flexible. Students are assigned a faculty adviser by the advising coordinator unless the student wants a particular adviser. The earlier the decision to major in CEH is made, the greater the freedom to develop a program to meet individual educational or career goals. Transfer students are urged to discuss their plans with a faculty adviser as soon as possible. Students may make an appointment directly with an adviser or with the advising coordinator, Alan Mathias, 120e Martha Van Rensselaer Hall.

Design and environmental analysis

The Department of Design and Environmental Analysis (DEA) is concerned with planning, designing, and managing interior environments to satisfy human needs. Most people spend over 90 percent of their lives inside buildings. Those settings have substantial and far-reaching effects on the quality of our lives. The processes for creating and maintaining the built environment face enormous challenges. These include frequent social and organizational change, technological advances, new building methods, and finite resources. The program in DEA is dedicated to preparing professionals who can meet these challenges.

Diverse faculty backgrounds and teaching approaches help students to develop their multidisciplinary problem-solving and creative abilities, aesthetic judgment, and analytical thinking. Excellent laboratory, shop, studio, and computer facilities permit exploration of innovative concepts for the design and management of interior environments. The relationship between people and their physical surroundings is explored through a combination of academic courses, field experience, and applied research. Examples of student class projects and faculty work are frequently on display in the department's gallery. The DEA Resource Center includes books, journals, newsletters, and materials samples for student use.

Options

The department offers undergraduate education in three professional areas: interior design, facility planning and management, and human-environment relations. The interior design option is accredited by the Foundation for Interior Design Education Research (FIDER).

To take full advantage of the course sequences and electives, it is important to select an option as early as possible. This is particularly true in the interior design option. Transfer students in the interior design option may need one or two extra semesters to complete the program.

Option I: Interior Design

The interior design option prepares students for professional careers in the planning and design of interior spaces and associated products. The program emphasizes a problem-solving approach based upon knowledge of buildings and their associated systems, furnishings and interior products, business and management, and human-environment relations. Some students combine this program with one of the other options.

Careers are available in interior design and space planning, interior architecture, facility planning, interior product design, and housing. This program also serves as an excellent preparatory for graduate study in interior design, facility management, architecture, and product design.

Option II: Facility Planning and Management

This option is designed to prepare students for professional careers in facility management. The program focuses on the planning, design, and management of facilities for large, complex organizations such as corporations, health-care institutions, research and development laboratories, and universities. Facility planning and management is a basic management function that coordinates and integrates information and expertise from areas such as planning and design, real estate and business administration, with human factors, ergonomics, environmental psychol-
ogy, telecommunications, and building operations for the purpose of developing and managing facilities that support individual and organizational effectiveness.

Excellent career opportunities exist in the facility management divisions of private companies, institutions, the health-care industry, and with private consulting firms offering facility management services. The program is also a good preparation for graduate study in business, planning, or one of the design disciplines and for advanced study in facility planning and management.

Option III: Human-Environment Relations

Human-environment relations focuses on the interaction between people and their physical surroundings. This option seeks to expand understanding of how the environment affects human perception, cognition, motivation, performance, health, safety, and social behavior, and to use that knowledge to help architects, planners, interior designers and product designers to plan, design, and manage safe and effective environments. The effect of human capabilities or characteristics such as family structure, life-style, social class, and stage in life cycle on environmental needs and requirements is also a focus of the program. Courses are available in design firms and in urban planning and other public agencies as well as in the facility management and product design division of private companies. Human-environment relations is good preparation for graduate study leading to a Ph.D. degree in the social sciences and a career in academic or other research-oriented settings in either the public or private sector. It can also serve as the basis for graduate environmental planning or design discipline such as architecture, facility planning and management, interior design, landscape architecture, or city and regional planning. Electives in the social sciences and in research methods and statistics are encouraged.

Academic Advising

All DEA majors are matched with a faculty adviser during their first semester by advising coordinator Michael Boyd, in E206 Martha Van Rensselaer Hall.

Consultation with faculty advisers about future goals, departmental requirements, sequences of courses, and electives inside or outside the college to meet special needs helps students develop their programs. Students majoring in interior design, especially, must begin early to plan and collect materials for a portfolio of their work, which is necessary for many positions and for application to graduate schools. Faculty advisers can make recommendations on what to include. Students are free to change advisers. Although advisers must sign the schedule card during course enrollment each term, it is the student’s responsibility to keep track of his or her courses and to make sure that the program meets graduation requirements for the major and the college.

Ownership and Exhibition of Student Work

All design work done in studios as part of an academic program is the property of the department until it has been released by the instructor. The department is not responsible for loss or theft of student work.

HUMAN DEVELOPMENT AND FAMILY STUDIES

The programs of the Department of Human Development and Family Studies (HDFS) are concerned with how people develop throughout their lifetime. Of equal interest is the family as a context for individual development and as a part of the larger structure of society. An ecological perspective—the person in interaction with complex biological, situational, and environmental conditions of everyday life—is featured in many departmental courses.

Major social science disciplines concerned with the development of individuals and with the structure and function of families are represented among faculty members with backgrounds in psychology, sociology, history, and education. The department’s programs of instruction, extension, and research provide diverse opportunities for students to prepare for career development or to acquire the bases for graduate study. Many of the department’s majors are interested in clinical psychology, counseling, law, medicine, special education, or university teaching and research that require some undergraduate study. Others may be directed into employment in business or industry or take bachelor’s-level positions such as youth counselors, day-care workers, personnel assistants, research technicians, and social program assistants.

Academic Advising

Every HDFS major is assigned a faculty adviser in the department, and advising conferences are required at least twice a year. An adviser helps plan the course work and consults with the student about career options. The adviser can also help students find special opportunities for individual study or for experience outside the classroom. Although advisers must distribute pin numbers, it is the student’s responsibility to keep track of his or her courses and to make sure that the program meets graduation requirements for the major and the college.

Students who need an adviser or who want to change advisers for any reason should check with the undergraduate adviser, Joanne Stumberg, in the department office, in NG14 Martha Van Rensselaer Hall.

Curriculum

HDFS majors usually combine a broad liberal education with a more specialized focus on either a problem of human concern or a substantive area of concentration. Areas of specialization available within HDFS include infant, child, adolescent, and adult development; abnormal development; family studies; and social-personality and cognitive development.

Some students combine an HDFS major with premedical or prelaw training or with teaching and research that require some graduate study. Others may go directly into employment in business or industry or take bachelor’s-level positions such as youth counselors, day-care workers, personnel assistants, research technicians, and social program assistants.

During their first two years, students are expected to complete a variety of liberal arts courses with HDFS core courses HDFS 115 (Human Development); HDFS 150 (Families and the Life Course); and intermediate courses in phases of the life course, cognition, or social-personality. This encourages diversity yet ensures a common base for upper-level courses in the major. Courses within the department vary from lectures and discussions to research and independent study.

All students are encouraged to participate in an experiential learning course in their particular area of interest. The course may focus on a naturalistic or laboratory setting (e.g., nursery school, youth detention center, retirement home) or on a research setting (e.g., interviewing, administering tests, observing behavior).

An HDFS major also takes a number of upper-level departmental courses in particular areas as described in the Student Guide. Additional information is available in the HDFS Office of Undergraduate Education, NG14 Martha Van Rensselaer Hall.

Math Requirement

HDFS majors are required to fulfill a math requirement by passing Education 115 or demonstrating equivalent competency by scoring 550 or higher on the math SAT examination.

Teaching Certification Option

The cooperative Cornell HDFS-State University College at Cortland education program is designed to meet New York State certification requirements for two or four years while simultaneously earning the Cornell bachelor’s degree in HDFS. The program requires that the student spend three years at Cornell and the senior year and part of two summers registered in absentia at SUC Cortland. Students keep their Ithaca housing, since Cortland is just 18 miles away and the one-semester teaching internship is based in Ithaca.

This highly selective undergraduate program offers an alternative to the option of seeking a master’s degree in education after the undergraduate studies at Cornell have been completed. Students interested in the program should discuss the merits of each option with the Coordinator of Undergraduate Education in NG09 MVR.

Course work at Cornell must be carefully planned. Elective options will be somewhat limited because it will be necessary to consider the twenty-seven Cortland credits plus three education courses at Cornell as electives. The teaching certification program is not an option for external transfers entering as late as upper sophomore or junior year.

More information is available in the HDFS Office, NG14 Martha Van Rensselaer Hall.

Honors Program

The honors program leading to a Bachelor of Science degree with honors in HDFS is designed to provide in-depth research experience for students interested in graduate school and to challenge students who enjoy research. Interested students should consult the coordinator of the honors program during their sophomore year.

A grade-point average of 3.3 is required for entry into the program. Honors students must take an approved course in research design, preferably in the sophomore or junior year.

Students spend part of their junior and senior year working on a thesis under faculty supervision, completing the project before April 15 of the senior year when the student’s oral examination is held. More information is available in the department’s Office of...
The HDFS faculty believe that competence in a foreign language is an essential liberal arts goal for the educated HDFS student. Such exposure opens another culture for exploration at both the instrumental and expressive levels, helps students understand language itself, and encourages knowledge of language as a fundamental intellectual tool and as an essential communicative asset with potential applied benefits. While this is not a graduation requirement, it is strongly recommended that HDFS majors develop competency in a second language.

The following departments teach foreign languages or literature or both in the College of Art and Sciences: African Studies and Research Center, Asian Studies, Classics, German Literature, Modern Languages and Linguistics, Near Eastern Studies, Romance Studies, and Russian Literature.

Work toward foreign language competency should be undertaken in the freshman and sophomore years. Please note that high school or transferred language courses can be used for advanced standing credit, even if the student does not want to do any further language work at Cornell.

Speakers of languages other than English may be awarded credit for their bilingual ability. Their English achievement is measured by the Test of English as a Foreign Language (TOEFL), a requirement for matriculation. Their performance in one other language learned outside the academic environment is measured by examination, and evidence of abilities in reading and writing, as well as speaking, is required. A maximum of 6 advanced placement credits are granted to students who demonstrate PROFICIENCY equivalent to course work at the 200 level or above at Cornell. Students may not earn credit both for PROFICIENCY in their native language and for studying English as a second language at Cornell.

Language Course Placement and Credit

Students who have had two or more years of high school study in a language may not register in any course in that language without being placed by examination. Nor may transfer students register without examination, even though they may have been given credit for language work elsewhere.

The type of examination depends on the language course and the level of achievement:

1) French, German, Italian, Russian, and Spanish courses: the standardized College Placement Test (CPT). Entering students who have not taken the CPT in high school and who want to continue their language study must take the CPT at Cornell during orientation week. Students may retake this examination at Cornell if they have studied the language a year or more since last taking the test. To do this, students register with the Academic and Career Counseling services, 203 Barnes Hall, and pay a fee.

2) Latin (all courses except 105 and 107): departmental examination.

3) Greek (all courses except 101, 104, and 111): departmental examination.

4) Arabic: departmental examination.

5) Hebrew: departmental examination.

6) Other languages: special examinations: see the professor in charge.

7) High achievement (students with a CPT score of 850 or better in French, German, Hebrew, Italian, Russian, and Spanish): the Cornell Advanced Standing Examination (CASE).

An entering or continuing student with high achievement scores should take the Cornell Advanced Standing Examination (CASE).

See section on College of Arts and Sciences, Language Requirement, for further information.

HUMAN SERVICE STUDIES

Faculty in the Department of Human Service Studies (HSS) prepare students for a variety of careers in programs that serve individuals, families, and the community. HSS graduates work in schools, social services, Cornell Cooperative Extension, health and mental health programs, and community development agencies.

They are employed in such positions as counselors, school teachers, social workers, community educators, planners, and researchers. Many HSS graduates pursue graduate study in law, education, medicine, social work, health, and a variety of social sciences. HSS majors come from diverse backgrounds, but they share a common goal of wanting to serve the needs of others.

HSS is unique in that it integrates a broad spectrum of courses offered by several departments and colleges and focuses them for professional practice in the human services. All HSS students take courses that provide a knowledge base in three content clusters:

1. Human service environments—course choices provide students with knowledge about the working context within which the human service provider functions, including a base in social psychology, group and organizational behavior, social system perspectives, power and leadership.

2. Human service programs—courses for this requirement are selected to provide the student an introduction to historical and current program models, barriers to service delivery, developments in health, education and social welfare—all in the context of both the client and the work done by the human service professional.

3. Human service processes—courses for this requirement are designed to provide students with methods to work effectively in human service programs and environments. Courses include planning and development content, program delivery modes, decision-making processes, basic social planning methods, and program evaluation.

All students take a professional internship and an integrative senior seminar. Regardless of their specific career goals, students acquire a broad understanding of human services and the ways they can collaborate to improve the human condition. In addition, students specialize in an area of concentration such as health, education, social welfare, policy, planning, or evaluation.

Academic Advising

It is important for a student who is interested in majoring in Human Service Studies to declare that major as early as possible. Once that is done, students work with their assigned faculty advisers to plan course work and related educational activities. Students are free to change advisers. Although faculty advisers must sign the schedule card during course enrollment each term, it is the student's responsibility to keep track of courses and make sure that the program meets graduation requirements of the major and the college.

Students may make an appointment with an adviser or with the undergraduate advising coordinator, Don Tobias, in 183 Martha Van Rensselaer Hall.

Social Work Program

The undergraduate social work major at Cornell has as its principal educational objective the preparation of students for beginning professional social work practice. In addition, the major in social work provides for graduate education in social work and contributes to the enrichment of a college education by helping students understand social welfare needs, services, and issues.

The social work program is accredited by the Council on Social Work Education. Students who complete all requirements are eligible to apply for beginning-level employment as professional social workers or to apply for advanced standing in a graduate school of social work.

TEXTILES AND APPAREL

The Department of Textiles and Apparel (TXA) focuses on the use of textiles and fibrous materials for apparel, durable and nondurable household goods, composites, geotechnical, and biomedical applications. Programs in the department, in keeping with the overall mission of the college, emphasize the use of materials to meet human needs. The curriculum includes the application of design principles, physical and materials science, economics and marketing, government policy/regulation, management of products and their delivery, and technological developments.

Practical problem-solving skills are developed in the department's laboratories and studios. Academic course work is further enhanced by field and international experiences. Gallery space provides the setting to display design work. In addition, the Cornell University Costume Collection, housed in the department, provides a valuable resource; items from the collection are made available to students for classroom and special-study use.

Academic Advising

All TXA majors are matched with a faculty adviser by the advising coordinator, Peter Schwartz (201 Martha Van Rensselaer Hall). Students are strongly urged to discuss their goals, course selection and sequence, electives, and career plans with their faculty
adviser. Students in apparel design must begin early to work with their advisers to develop a professional portfolio of their work. Students are free to change advisers; changes must be recorded with the advising coordinator. Although advisers must sign the schedule card during course enrollment each term, it is the student's responsibility to keep track of his or her courses and to make sure that the program meets graduation requirements for the major and the college.

Ownership and Exhibition of Student Work
All apparel design work done as part of the academic program is the property of the department until it has been released by the instructor. Certain exceptional work may be retained by the department to exhibit for academic purposes. The department is not responsible for loss or theft of student work.

Course Fees
No grade will be given in a course unless the course fee has been paid by the last week of classes.

Key Policy for Apparel Design Studios
To allow design students access to studios for out-of-class work at any hour in which Van Rensselaer Hall is open, and to provide security for the studios, the department has instituted a key policy. Each student in TXA 040, 145, 264, 267, 375, 425, 446, and 465 who submits a security deposit of $50 will be given a key to the studio in which his or her class is held. In the event that any key is lost, the studio will be rekeyed, and the cost will come from the security deposit of the student who lost the key. At the end of each semester, the studio will be assessed for missing and damaged equipment. The total amount assessed will be deducted from the security deposits of all students assigned to that studio. If all keys are returned and no damage or theft is reported, the security deposits will be returned at the end of the semester. Students who work outside of class hours may elect not to have a key and therefore will not be required to submit a security deposit. Under no circumstances will these students be admitted to the studio outside of class hours.

Options
Students may select options in apparel design, apparel-textile management, or fiber science. The curriculum is based on manipulation of form, color, and the physical characteristics and structures of fabric to solve functional and aesthetic apparel problems; the application of economic and marketing principles to consumer and industry problems in the textile-apparel sector; and the study of textile-apparel management, consumer and industry problems in the textile-apparel sector, in independent and government-sponsored research, and in community organizations. Recent graduates are working in the fields of new product development, design, management, engineering, communications, and marketing. In addition, the program prepares students for graduate or professional study in fiber and polymer science, textile marketing, apparel design, textiles, or business and management.

INTERDEPARTMENTAL MAJOR IN POLICY ANALYSIS
As our economy has become more complex, so too has the role of the public sector in society. An understanding of governmental processes and of how public policies affect the several segments of society has become more important. Individuals with the ability to evaluate government programs critically and trace their impacts quantitatively to consumers, families, business, and industry are in demand at all levels of government and business. Supervised by the Department of Consumer Economics and Housing, the policy analysis major uses the resources of the college and the university to trace and estimate government's influence in the economy.

In the policy analysis major, the student gains a basic understanding of the role of government in the economy and the political environment in which policy is made. Students concentrate on learning the economic, cost/benefit, and statistical skills necessary to evaluate the performance of government programs as well as to government policy, housing policy, welfare policy, environmental policy, foreign policy, for example. Because experience in legislative, regulatory, and public administration activities is helpful in providing the context for policy analysis, involvement in Field and International Study, Cornell-in-Washington, and Cornell Abroad is encouraged. The specific requirements for policy analysis are listed under the interdepartmental majors.

Graduates in policy analysis are attractive to business and industry as well as to government because of their analytical skills in economics and statistics, and their knowledge of political processes. Students also use the major for further work in policy studies, law, and business administration.

The policy analysis major is flexible and allows individual program planning. The faculty adviser assigned by the undergraduate advising coordinator can help develop a program to meet individual educational and career goals. This is particularly important in constructing the appropriate policy concentrations. Transfer students are urged to contact their faculty adviser as soon as possible. An appointment may be made directly to talk either with an adviser or with the advising coordinator, Jennifer Gerner, 132 Martha Van Rensselaer Hall.
approved, the curriculum must be within the focus of the college and be interdisciplinary in design, include at least 40 credits in human ecology courses, and not exceed the normal number of credits allowed in the endowed divisions. A student develops an individual curriculum in consultation with faculty advisers from at least two subject-matter fields and the program coordinator.

Such a program of study should encompass a substantial part of the student's undergraduate education and must include at least three semesters. For this reason, a request to follow an individual curriculum should be made as early as possible and must be made before the second semester of the junior year.

If an individual curriculum seems advisable, Patti Papapietro, the individual curriculum coordinator in the Office of Student Services, N101 MVR, will provide direction in formally developing a program of study. Although the individual curriculum coordinator must sign the course enrollment schedule during course enrollment each term, it is a student's responsibility to follow the curriculum as planned or to have any necessary revisions approved in writing by his or her advisers and the program coordinator in advance of the program change.

SPECIAL OPPORTUNITIES

Several programs allow students to receive academic credit for fieldwork and internship experience, study abroad, study in absentia, college-wide certificate programs, and joint programs with other schools and colleges at Cornell. Students may petition the college registrar to have concentrations that are formally recognized elsewhere within the university noted on their transcripts, when accompanied by appropriate documentation from the program.

International Study

Study abroad allows students to focus on international issues and intercultural understanding through sponsored programs of study abroad for which academic credit is available. Course work in a foreign institution will, in general, be planned to increase knowledge of the people and institutions of the country concerned; fieldwork may provide guided experience in family, community, or agency situations of the country concerned and in an area related to individual student interest in human ecology.

Opportunities for study abroad are available for human ecology students in several ways: through Cornell Abroad, through U.S. college-sponsored programs abroad, and through direct enrollment in a foreign university. In all cases, students remain registered at Cornell during the overseas study, and their study abroad will be credited as part of their Cornell degree program. Application packets for study abroad can be obtained from and should be submitted to the study-abroad adviser in the Office of Student Services, N101 Martha Van Rensselaer Hall. The Student Resource Center, N139 Martha Van Rensselaer Hall, has catalogs and other information about study abroad opportunities. The study abroad adviser is Mary Rhodes, N101 Martha Van Rensselaer Hall.

Field Study, Internships, and Research Opportunities

Field study, internships, and research opportunities allow students to receive academic credit for work that extends and complements their course of study. Through structured experiences facilitated by faculty members, students learn to test, deepen, and apply what they've learned in the classroom.

Students strengthen their ability to integrate theory and practice and learn to reflect critically on their experience while broadening their understanding of service and professional life and enhancing their understanding of diversity and complex societal issues. In existing courses and through individual and group projects, students develop an intellectual framework for understanding and solving problems in a variety of challenging settings.

Placement opportunities are available in business, health, law, medicine, environmental analysis, education, nutrition, government, laboratories, textiles and apparel, design, social service and community settings. Students are encouraged to plan early for these opportunities.

To learn more, students should consult with their faculty adviser, professor, or undergraduate advising coordinator. They can also visit the Student Resource Center in N-139 MVR and explore listings of opportunities on the "Human Ecology Field Study Computer Program" available on Bear Access. New initiatives are announced. For further information, contact Debra Dyason, Field Study Coordinator, N-137 MVR.

Cornell in New York City

The Urban Semester Program in Multicultural Dynamics in Urban Affairs

Cornell in New York City provides students with many study options that focus on multicultural dynamics in urban affairs. Experiential learning practices inform all courses of study. The options available include internships, individual and group community service projects, research, independent study, collaborative learning, and mentorships. Students learn by doing and through reflection and action. Program options are possible throughout the academic year, during winter break, and in the summer.

Courses of study enable students to seek out the relationship between theory and practice, apply theory to practice, acquire professional practice skills, and learn about the impact of diversity on New York City. By applying ethnographic research techniques and methods, students learn to think conceptually, reflect on their actions, and learn how to be agents of change.

Several majors in the college require internships or encourage field study. Check with the advising coordinator of each major for more information. The Student Resource Center in N-139 MVR and the Field Study Coordinator in N-137 MVR can help you find internships and provide more information on department opportunities and enrolling in Cornell in New York City.

The Urban Semester Program in Multicultural Dynamics in Urban Affairs

Fall and spring semesters: HE 408

During the fall and spring semesters, students focus on multicultural issues in urban affairs. Each term, course work in two separate seminars investigates multicultural dynamics in professional, community, or public policy settings. Students study the possibilities and barriers that a multicultural society presents and their relationship to professional practice, culture, and identity.

Students intern in placements of their own choosing and use internship sites to study multicultural issues and dynamics. A list of recent placements follows. Students may choose to participate in Dr. Sam Beck's South Bronx-Banana Kelly/Cornell University Project in Community Building instead of an internship placement. Other options also are available.

The Winter Intersession in Community Service and Mutual Learning: The South Bronx-Banana Kelly/Cornell University Project in Community Building

Winter intersession: HE 402

Over the course of two intensive weeks, students participate in an ongoing community service project in the South Bronx. Students are carrying out community service, students participate in a research project with the director of the Cornell in New York City program. In the 1995 intersession, six students mentored 12 children in an after-school program by documenting the community with photographs and stories. A photography exhibit was produced that is presently circulating. Other projects with Banana Kelly are available to students throughout the year. Please contact Dr. Sam Beck in the Cornell in New York City program office.

Fieldwork in Diversity and Professional Practice

Summer session: HE 406

Over the course of an eight-week summer session, students carry out research projects on the multicultural dynamics of professional practice by interning full time in settings of their choice. Students meet weekly for three hours and discuss professional practice with New York City practitioners. A reflective seminar, led by Dr. Sam Beck, director of the Cornell in New York City program, follows each discussion.

Gerontology Concentration

Gerontology Certificate Program

This program develops students' understanding of and competence in dealing with the processes and issues of aging. Study in gerontology provides practical experience and preparation for professional work. Students draw on resources of several departments and colleges at Cornell and Ithaca College to shape a curriculum suited to their professional goals and interests. Contact the Gerontology Coordinator, Life Course Institute, 259 Martha Van Rensselaer Hall.
Teacher Certification in Home Economics

Students can combine any major in the college with additional course work that leads to home economics teacher certification (kindergarten through twelfth grade) in New York State and a number of other states. Interested students should contact the Office of Student Services in N101 Martha Van Rensselaer Hall.

University Programs

Africana Studies and Research Center

Courses taken in the Africana Studies and Research Center (ASRC) may be used to meet some of the distribution requirements of the college. Up to two courses or 8 credits of such courses may be applied toward the 12 additional credits in natural and social sciences (section I-C of the graduation requirements) or toward the 9 additional credits in communication, analysis, and the humanities (section II-B). This allowance is in addition to the freshman writing seminar credits that may be taken in ASRC. Other courses taken in the center count as endowed division electives (area IV).

Double-Registration Programs

Johnson Graduate School of Management

A limited number of highly qualified students from Cornell undergraduate divisions, including human ecology, may be accepted by the Johnson Graduate School of Management after the junior year. Students need the approval of the admissions office and the registrar in the College of Human Ecology. Accepted students should be aware that if the management course work taken in the senior year is in excess of the 21 additional credits allowed in the Cornell endowed divisions, they will be charged for the additional credits on a per-credit basis. Students entering this program must also complete requirements for the degree and major in Human Ecology.

Law School

A small number of highly qualified applicants may be admitted to the Cornell Law School after only three years of undergraduate education. The requirements for admission under these circumstances are more stringent than for acceptance after four years of undergraduate study. Applicants must present outstanding qualifications and strong professional motivation. The junior-year applicant follows the ordinary application procedures for Cornell Law School admission. Interested students should contact the Law School director of admissions to discuss the extraordinary admissions criteria. Because students accepted to this program will spend their senior year in the Cornell Law School, they need to plan ahead to ensure that distribution requirements for the B.S. degree from the College of Human Ecology will be met. Successful applicants need the approval of the college registrar.

Cornell Medical College

A limited number of highly qualified students from three Cornell divisions, including the College of Human Ecology, may be accepted by the Cornell Medical College after the junior year. To be considered for this program, the student must have completed 105 credits toward graduation by the end of the junior year. Students also need to plan ahead to ensure that distribution requirements for the bachelor of science degree will be met. Accepted students receive 15 credits toward the B.S. degree from their first year of study at the College of Human Ecology. Interested students should contact the Health Careers Program office in 103 Barnes Hall.

Off-Campus Programs

New York State Assembly Internships

A limited number of session internships with the New York State Assembly are available in spring semester. Interns must be sophomores or higher and enrolled in New York State colleges or universities. Human ecology students apply to the program through the student's major department. The New York State Assembly also sponsors a summer internship. Further information about internship programs may be obtained through the Office of Student Services, N101 Martha Van Rensselaer Hall.

Cornell-in-Washington

For information on Cornell-in-Washington, see the section, Interdisciplinary Centers, Programs, and Studies, in the front of the catalog.

Ithaca College

Full-time undergraduate students at Cornell may petition to enroll in courses at Ithaca College. Students pay regular tuition to Cornell and only special fees to Ithaca College, if any are charged. Students are allowed to register for one course a term and may take no more than 12 credits in four years. Exceptions will be granted to Cornell students enrolled in methods and practice-teaching courses at Ithaca College.

Cornell students are eligible to register only in Ithaca College courses that are relevant to their program and that do not duplicate Cornell courses. Acceptance of Cornell students into Ithaca College courses is on a space-available basis. Participation in this program is not guaranteed, and Ithaca College has the right to accept or reject students for any reason it deems appropriate. The program is available only during the fall and spring semesters.

For further information students should contact the college registrar, N101 Martha Van Rensselaer Hall.

Wells College

Full-time undergraduate students at Cornell may petition to enroll in courses at Wells College. Students pay regular tuition to Cornell and only special fees to Wells College, if any are charged. Students are allowed to register for one course a term and may take no more than 12 credits in four years. Exceptions will be granted to Cornell students enrolled in methods and practice-teaching courses at Wells College.

Cornell students are eligible to register only in Wells College courses that are relevant to their program and that do not duplicate Cornell courses. Acceptance of Cornell students into Wells College courses is on a space-available basis. Participation in this program is not guaranteed, and Wells College has the right to accept or reject students for any reason it deems appropriate. The program is available only during the fall and spring semesters.

For further information students should contact the college registrar, N101 Martha Van Rensselaer Hall.

PLANNING A PROGRAM OF STUDY

Academic Advising

Students who choose to major in a particular department are assigned to a faculty adviser by that department's advising coordinator. The advising coordinator can help match a student's needs with the special interests of a faculty member. Students may change advisers as their own interests change and should see the advising coordinator to discuss such a change. Faculty advisers, and counselors in the Office of Student Services (N101 Martha Van Rensselaer Hall), are available to discuss course requirements and sequences, and electives inside or outside the college, as well as future goals and career opportunities. Although advisers must sign the course enrollment schedule card during course enrollment each term, it is the student's responsibility to make sure that her or his program meets graduation requirements for the major and the college. Advising coordinators in each department are available to answer questions about the advising system and the undergraduate major. Students who are exploring alternative majors should work closely with college counselors who are available for planning a referral to department resource faculty.

Completing Graduation Requirements

A summary of record is kept for each student in the Office of Student Services, N101 Martha Van Rensselaer Hall. At fall registration each continuing student receives a copy showing which major and graduation requirements have already been met. It is important to check this summary and to bring any questions to the attention of staff members in the Office of Student Services. Although a student may complete the requirements of more than one major, he or she is officially certified to graduate under only one.

Electives

Students have individual objectives in choosing courses beyond the minimum requirements of the major. The university is diverse; the departments, centers, and special programs numerous; the fields of study almost unlimited. Counselors and department advisers are available to discuss which courses may interest students and round out their educations.

Students should consult the index of this Announcements for information on where different subjects are taught in the university. Some subjects are taught in more than one division of the university.

Foreign Language Study and Placement

Students who studied a foreign language before coming to Cornell and who want to continue must take either the College Entrance Examination Board (CEEB) achievement test in that language or a departmental language placement test. The latter is given during orientation week in September and again in December, January, and May. Students in human ecology who plan to work...
with non-English-speaking people in this country or abroad often find it necessary to be proficient in another language. Students who wish to study abroad may find that many study-abroad programs in non-English-speaking countries require the equivalent of two years of college-level language study. For more detailed information, see the section "Advanced Placement of Freshmen."

GRADUATION REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

General
Students applying as undergraduates who do not have the required academic unit in biology, chemistry, or physics are required to show evidence of having met this deficiency before matriculation in the college.

Freshmen and sophomores are required to enroll in at least one human ecology course per semester.

To graduate, students need to:

1) meet college credit and distribution requirements.
2) complete requirements for a major,
3) achieve a cumulative average of 1.7 (G−) or better,
4) fulfill residency requirements, and
5) complete two terms of physical education within the first two semesters.

College Requirements
These are the general areas of study and specific courses and credits required of every student in the college. The major you choose may require specific courses listed below or may leave you free to choose among certain courses listed there.

I. Natural and Social Sciences (24 credits)


B. Social sciences (6 credits) selected from economics (including CEH 110, 111, but excluding Agricultural Economics 221 and 310), psychology (including Education 110, 311, 317, DEA 150, HDFX 115, 216, 217, 218, 219); sociology (including rural sociology, CEH 148, and HDFX 150). Do not take both Economics 101 and CEH 110; Economics 102 and CEH 111; Psychology 275 and HDFX 360; Rural Sociology 101 and Sociology 101 or Sociology 243 and HDFX 150; they are equivalent courses.

C. Additional credits (12 credits) selected from any subjects listed above or from courses in anthropology (except archaeology); Astronomy 101 or 102; biochemistry, microbiology; genetics and development; Geology 101; and government.

II. Communication, Analysis, and the Humanities (15 credits)

A. Freshman writing seminars (6 credits) selected from courses listed in the freshman writing seminar brochure.

B. Additional credits (9 credits) selected from art; communication; comparative literature; computer science; drawing; English; ancient or modern foreign languages; history; history of art; history of architecture; mathematics; music; Natural Resources 407; philosophy; statistics (students should not take both Industrial and Labor Relations 210 and Agricultural Economics 310, since the courses are substantially the same); theatre arts; DEA 101, 111, or 115, HSS 292, TXA 117, 125, 375; and selected ASRC courses (list available in the Office of Student Services, N101 Martha Van Rensselaer Hall).

III. Human Ecology (40 credits)

A. Requirements for the major (the number of credits required varies by major and option).

B. Other credits in Human Ecology (15)

The following specific qualifications apply:

• No credit for HE 00 courses. HE 100, HE 101, or any 403 course can be counted to fulfill this requirement.

• A maximum of three credits of special studies courses (400, 401, and 402) or of any internship credit can be used.

• A maximum of six credits of HE 401 can be used.

Transfer students (external and internal) can meet this requirement by completing 15 credit hours comprised of transfer credit and credit earned in the college, or comprised of credit hours all taken in the college and prorated according to the student's status at matriculation. (Refer to "Policies Related to College Requirements" in the Human Ecology Student Guide for details of this policy.)

All students, including internal and external transfer students, must complete a total of 40 credits in Human Ecology.

IV. Additional Credits (41 credits)

A. Requirements for the major (number of credits varies from 0 to 15 credits).

B. Electives (number of credits varies from 26 to 41 credits).

Credit requirements in this section are met through courses in the state divisions of Cornell:

• College of Human Ecology (in addition to courses in sections I, II, and III)

• College of Agriculture and Life Sciences

• School of Industrial and Labor Relations

• College of Veterinary Medicine

and through courses in the endowed divisions of Cornell:

• Africana Studies and Research Center

• College of Architecture, Art, and Planning

• College of Arts and Sciences

• College of Engineering

• School of Hotel Administration

• Johnson Graduate School of Management

Courses in the endowed divisions in this section may not exceed a total of 21 credits.

V. Physical Education (2 credits)

Students who have successfully fulfilled these requirements should have completed at least two terms of physical education in their freshman year.

Related Policies

College course requirement. Freshmen and sophomores are required to enroll in at least one course in the College of Human Ecology each semester. Students who fail to comply with this requirement will be reviewed by the Committee on Academic Status for appropriate action.

Section II. Students who score 4 or 5 on the Princeton AP Exam are awarded 3 credits in English. Students who score 5 on the Princeton Exam are exempt from one freshman writing seminar in addition to the 3 English credits awarded.

In sections I, II, and III, the required credits listed are the minimums; credits taken in excess of those minimums (section I, 24 credits; section II, 15 credits and section III, 40 credits) count toward electives (section IV, 41 credits).

In sections I and II, courses specified by the major to meet the requirements in the sections may either be used as meeting the credit requirements in those sections or be applied toward the additional credits in section IV.

Section IV. There is no limit to the number of credits that may be taken in the state divisions of Cornell, and therefore students may choose to take additional state credits and graduate with more than 120 credits.

Credits in the endowed divisions in this section may not exceed 21. Any course taken in an endowed division for which a grade of F or U is received will be counted as part of the 21 endowed credits allowed.

E elective credits earned in Cornell's endowed divisions during summer session, in absentia, transfer credits are counted as credits earned in the state divisions and therefore do not count as part of the 21 credits allowed in the endowed divisions in meeting the requirements of this section.

Not more than 21 credits in section IV may be taken in the endowed divisions of the university except under both of the following conditions:

1) The students must have senior status (must be in the final two semesters prior to graduation).

2) Payment must be made for each credit taken in excess of the 21 allowed, whether or not the courses are passed. For the fee per credit charge, students should call the Office of the Bursar.

Related Policies for Transfer Students

Section I-A. Transfers who enter human ecology programs in consumer economics and housing, design and environmental analysis, human service studies (with the exception of the social work program), and policy analysis can satisfy the College of Human Ecology's natural science graduation requirements with any course(s) taken to meet a former college's
natural science requirements as long as the course(s) transferred dealt with matter, energy, and their interrelationships and transformations. Courses in areas such as psychology and mathematics are not included, even though courses in these areas may have been taken to meet a former institution's natural science requirement.

Section II-A. Transfer students should have taken at least 6 credits in courses in English composition or in courses requiring substantial writing and offering instruction in writing equivalent to that offered in the freshmen writing seminar program at Cornell. Students who have not fulfilled this requirement before transferring must fulfill it at matriculation.

Section III-B. External transfer students can meet the requirement for course work outside the major in the College of Human Ecology by completion of either of the following:

1) 15 credits of work, outside their department, comprised of transfer credit and credit earned in the college.

2) credits all taken in this college (no transfer credit is allowed to meet this requirement), on the basis of the status of the student's matriculation and prorated as follows:

<table>
<thead>
<tr>
<th>Status at Matriculation</th>
<th>Credits to Satisfy Work outside the Major</th>
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</thead>
<tbody>
<tr>
<td>Freshman (1-25 transfer credits)</td>
<td>15</td>
</tr>
<tr>
<td>Sophomore (26-55 transfer credits)</td>
<td>12</td>
</tr>
<tr>
<td>Junior (56-85 transfer credits)</td>
<td>9</td>
</tr>
<tr>
<td>Senior (86-120 transfer credits)</td>
<td>9</td>
</tr>
</tbody>
</table>

Transfer students from other Cornell divisions are required to take the full 15 credits outside the major.

Note that transfer students are still responsible for completing a total of 40 human ecology credits under Section III.

Section IV. Transferred credits for courses applied toward electives do not reduce the 21 Cornell endowed credits that students are allowed. Courses with a passing grade below C– will not transfer to meet human ecology degree requirements.

Section V. Transfer students who have had the equivalent of two semesters of college (and therefore enter as sophomores) are not required to take physical education at Cornell, regardless of whether they took physical education at their first college. Exemption or postponement for medical reasons must be cleared by Gannett Health Center. For further information about exemption from, or postponement of, physical education, students should consult the college registrar, Mary Rhodes, in N101 Martha Van Rensselaer Hall.

Residency Requirements

All course curricula are planned to fit within an eight-semester program. An average schedule of 15 credits a semester (in addition to physical education) is considered standard, and if pursued for eight semesters, will provide the credits needed for graduation. If the student completes all the requirements—for the major, for distribution, for total credits, and for cumulative average—in fewer than eight semesters, the degree may be conferred at the end of the semester in which the last requirements are met. Students who plan to receive their degrees early should notify the college registrar at the beginning of the semester so that the course plans can be placed on the list of degree candidates.

Sometimes a student (particularly a transfer student) may need an additional semester to complete a program. To register for a semester beyond the eighth, the student submits a petition to the college registrar in the Office of Student Services, N101 Martha Van Rensselaer Hall. The petition should detail the reasons for wanting to enroll for the extra semester and include a list of courses planned for the additional semester. Such requests are usually granted when there appears to be no feasible way for the student to complete the professional curriculum or the degree requirements without the extra semester.

Freshmen entering the college with 15 transfer credits have seven semesters in which to complete the degree. Transfer students must complete at least 60 credits at Cornell.

Mature students (those at least twenty-four years old at the time of matriculation) are not required to petition the college registrar for approval to study beyond the usual eight semesters.

Exemptions from Requirements

Students who want an exemption from a specific graduation or major requirement may petition, and approval may be given under certain circumstances. Full information about the petition process is given in the Human Ecology Student Guide. Petition forms are available in the Office of Student Services, N101 Martha Van Rensselaer Hall.
A student who wants to take special studies courses talks with the faculty member under whose supervision the study would be done and then prepares a plan of work. If the faculty member agrees to supervise the study, the student completes a multiplicity special studies form, a multiplicity description of the study to be pursued. The student obtains the signatures of the instructor and the department chair as well as the student's department advisor before submitting it to the Office of Student Services. The student also must complete a course registration form in the Office of Student Services. Special studies forms and instructions are available in the Office of Student Services, N101 Martha Van Rensselaer Hall.

To register in a special studies course taught in a department outside the college, students should follow the procedures established for that department.

Course Loads
The normal course load in the college ranges from 12 to 18 credits. During the course enrollment period no student may enroll for more than 15 credits or five courses, whichever is greater, without special permission from the college registrar. To receive permission, a student attaches a note to the course schedule, citing reasons(s) for carrying a heavier load, before submitting it to the Office of Student Services, N101 Martha Van Rensselaer Hall.

Credits beyond 15 may be added during the first three weeks of the semester without special permission. Students should avoid planning excessive work loads; the time required to keep abreast of courses tends to increase as the semester progresses. Courses cannot be dropped after the seventh week of classes without petitioning, so students should try to avoid the need to drop courses.

Except for those with mature student status, students must carry at least 12 credits (exclusive of physical education). In special cases, a student may petition to carry between 8 and 12 credits. Forms for petitioning and advance on course loads are available from the Office of Student Services, N101 MVR.

Except for mature students, it is seldom possible to have tuition prorated if a student carries fewer than 12 credits during a semester. (See the college registrar for more information.)

Students of mature status may carry 6 to 12 credits without petitioning and may have tuition prorated. However, at the beginning of each term, mature students planning to take a light course load should pick up a proration form from the Office of Student Services, fill it out, have it signed by the college registrar, and return it to the bursar's office in Day Hall.

Oversubscribed Courses
Enrollment in many human ecology courses is limited. When a course is over enrolled, students are generally assigned on the basis of seniority or by criteria defined for each course as listed in Cornell University: Courses of Study. Student's professional goals may be considered. Those students not admitted to a course may be placed on a waiting list.

Late Course Enrollment
Students who do not file a course enrollment form during the course enrollment period usually must wait until the beginning of the semester to enroll. Extensions are rarely granted and usually only for documented illness.

Students who do not meet the deadline for any reason should see the college registrar in N101 MVR as soon as possible. The college registrar can explain available options on course enrollment procedures under such circumstances.

University Registration
University registration for human ecology students occurs in the auditorium of MVR Hall during the week preceding the start of classes. The Office of the University Registrar announces the specific times of registration.

At registration, students first have their ID validated and then pick up a college registration card at the university table immediately inside the door of MVR auditorium.

Next, students fill out the college registration card and proceed to the college table where they submit their college registration card; in return, they receive a computer printout of courses for which they are officially enrolled.

Important: Students are responsible for checking their course schedule for accuracy of course numbers, credit hours, and other data. Students must correct errors immediately. Procedures for correcting enrollment errors as well as making changes for other reasons are described below under Course Enrollment Changes.

Students also receive a Course and Room Roster which indicates the locations of their classes.

During university registration in the fall semester, each continuing student receives a copy of his or her summary of record from the Office of Student Services. This summary shows graduation and major requirements that the student has completed. Students are responsible for assuring that their academic programs meet graduation requirements. They resolve any questions about graduation requirements with the appropriate staff person in the Office of Student Services. Students may direct questions about their academic programs to their faculty adviser or to a counselor in the Office of Student Services.

Late University Registration
A student clearing his or her financial obligations after the deadline date on the bursar's bill is considered late. Late registrants are assessed a finance charge on the bursar's bill starting from the date the bill is due.

All students must be registered according to university policy before the end of the third week of classes. If for any reason a student registers after that time, there will be a $200 additional charge.

After completing late university registration, the student submits the college registration card to the Office of Student Services and receives a computer printout of the courses for which he or she is officially registered.

Students who fail to register by the third week of the term will be withdrawn from the university. Students who wish to return, they must reapply through the admissions committee.

Course Enrollment Changes

Deadlines
- During the first three weeks of the term, courses may be added or dropped.
- From the fourth through the seventh week of the term, course changes may be made with the permission of the instructor (instructor's signature on the add/drop form).
- From the fourth 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.
- From the eighth week of the term, no course change may be made without petitioning for approval. Petitions are usually granted only in circumstances beyond a student's control (for example, illness). A student petitioning for medical reasons should provide substantiating medical evidence with the petition.
- A student who submits a petition after the seventh week of the term requesting permission to drop a course must attach a statement from his or her faculty adviser to that petition indicating whether or not the advisor supports the request.

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Important: Students are responsible for checking their course schedule for accuracy of course numbers, credit hours, and other data. Students must correct errors immediately. Procedures for correcting enrollment errors as well as making changes for other reasons are described below under Course Enrollment Changes.

Students also receive a Course and Room Roster which indicates the locations of their classes.

During university registration in the fall semester, each continuing student receives a copy of his or her summary of record from the Office of Student Services. This summary shows graduation and major requirements that the student has completed. Students are responsible for assuring that their academic programs meet graduation requirements. They resolve any questions about graduation requirements with the appropriate staff person in the Office of Student Services. Students may direct questions about their academic programs to their faculty adviser or to a counselor in the Office of Student Services.

Late University Registration
A student clearing his or her financial obligations after the deadline date on the bursar's bill is considered late. Late registrants are assessed a finance charge on the bursar's bill starting from the date the bill is due.

All students must be registered according to university policy before the end of the third week of classes. If for any reason a student registers after that time, there will be a $200 additional charge.

After completing late university registration, the student submits the college registration card to the Office of Student Services and receives a computer printout of the courses for which he or she is officially registered.

Students who fail to register by the third week of the term will be withdrawn from the university. Students who wish to return, they must reapply through the admissions committee.
special studies courses must be completed. Aside from the procedures listed below for course enrollment changes, all course change forms for **nuke majors** must be signed by the faculty department adviser.

**Waiting List:** The Office of Student Services maintains waiting lists for students who want to enroll in courses that have been filled. Waiting lists are maintained on a first-come, first-served basis without regard to seniority or other factors. To keep their names active on a waiting list, students must check in **every 48 hours** with the Office of Student Services; names of students who do not check in are automatically dropped from the list.

**Limited enrollment classes:** Students who do not attend the first two class sessions of courses with limited enrollment may be dropped from the course list. Students can avoid being dropped from a class by notifying the instructor that unavoidable circumstances have prevented their attendance.

There is no charge for course changes. To make course changes during the **first three weeks**, a student takes the following five steps:

1. Obtains a course-change form from the Office of Student Services, N101 MVR.
2. Completes the form and takes it to the appropriate office for signature: for human ecology courses, the forms should be taken to the Office of Student Services; for courses outside the college, the forms should be taken to the appropriate departmental office in the other college.
3. Makes sure that his or her name is added to the list of enrolled students for a course being added, or removed from the class list for a course being dropped. Asks the person recording the change to sign the form.
4. Submits all signed forms to the Office of Student Services, including the forms for **out-of-college courses**. Changes are not completed until the signed forms are filed in that office. If a student does not drop a course that he or she no longer wants, the student is in danger of receiving an **F** in the course.
5. Receives carbon copies of each course change form at the time it is submitted. It is **important** for students to keep these copies to verify later that the forms were filed.

To make course changes during the **fourth through seventh** weeks of the term, a student takes the following steps:

1. Completes the five steps listed above for changes made during the first three weeks.
2. Obtains the instructors' signatures on the course change form for human ecology courses.

To make course changes after the **seventh week** of the term, a student must file a general petition form. (See the section below, **Petition Process.**) Students are expected to attend classes and to do assigned work until the petition has been formally approved or denied.

**In absentia Study**

Under certain conditions, credit toward a Cornell degree may be given for in absentia study, that is, study done at an accredited institution away from Cornell after the student matriculates in the College of Human Ecology.

To be eligible for in absentia study, a student must be in good academic standing and must receive permission in advance from the college registrar. Students not in good standing may study in absentia but will not receive transcript credit until they have been returned to good standing by the Committee on Academic Status. In some cases, students may petition for in absentia credit after the work has been completed, but there is no guarantee that such credit will be awarded without advance approval.

In absentia petition forms are available in the Office of Student Services, N101 MVR. The student completes the form, has it signed by his or her faculty adviser, attaches catalog descriptions for the courses that will be taken, then submits the form to the Office of Student Services, N101 MVR.

Students receive notice of the petition decision by means of a letter from the college registrar. A student may take up to 15 credits in absentia in one semester. In any one academic year, students may petition for more than 15 credits in absentia under the following conditions: (1) the work taken represents a special educational opportunity not available at Cornell, (2) it relates to the student's particular professional goals, and (3) those goals are consistent with the focus of the college. The in absentia petition form is used to request more than 15 credits in absentia.

The college registrar requests approval from the appropriate department if a student wants to apply in absentia credit to requirements for his or her major. If in absentia credit is sought for a modern foreign language in which the student has done work, approval by the Department of Modern Languages and Linguistics (College of Arts and Sciences) must be obtained. The department will recommend the number of credits the student should receive and may require the student to take a placement test after returning to Cornell.

The student is responsible for having the registrar of the institution where in absentia study is taken send transcripts of grades to the Office of Student Services in the College of Human Ecology. Only then will credit be officially assessed and applied to the Cornell transcript. Credit for in absentia study will be granted only for those courses with grades of **C-** or better. Only credits (not course names and grades) appear on the Cornell University transcript.

A student who holds a Regents' or Children of Deceased or Disabled Veterans Scholarship may claim that scholarship for study in absentia if the study is done in a college in New York State and if it is for a maximum of 15 credits acceptable to the College of Human Ecology.

The rules regarding study in absentia apply to transfer students with the additional stipulation that at least 60 credits must be taken at Cornell. At least 40 of the 60 credits must be in the College of Human Ecology at Cornell unless the student has transferred equivalent human ecology credit. (No more than 20 credits of equivalent credit may be applied to the 40 credits required in human ecology course work.)

**Leaves of Absence**

A student may request a leave of absence before the beginning of the semester or during the first seven weeks of the semester for which a leave is sought. A leave may be extended for a second semester by requesting an extension in writing from the Office of Student Services.

A student considering a leave of absence is urged to discuss plans with a counselor in the Office of Student Services. The counselor can supply the necessary forms for the student to complete and file with the Office of Student Services, N101 MVR.

Requests for a leave of absence received after the first seven weeks of the semester, or requests for a leave of absence from students who have already had two semesters' leave of absence, will be referred for action to the Committee on Academic Status. The committee may grant or deny such requests, attaching conditions as it deems necessary. Leaves of absence after the first seven weeks are generally granted only when there are compelling reasons why a student is unable to complete the semester, such as extended illness.

A student who requests a leave of absence after the first seven weeks is advised to attend classes until action is taken on the petition. A student whose petition for a leave of absence is denied may choose to withdraw or to complete the semester.

The academic records of all students who are granted a leave of absence are subject to review, and the Committee on Academic Status may request grades and other information from faculty members to determine whether the student should return under warning or severe warning or in good academic standing.

**Withdrawal**

A withdrawal is a termination of student status at the university. Students may voluntarily withdraw at any time by notifying a counselor in the Office of Student Services and filing a written notice of withdrawal in the Office of Student Services. A student considering such an action is urged to discuss plans with a counselor in the Office of Student Services, N101 MVR.

In some instances a student may be given a withdrawal by the college registrar. A student who leaves the college without an approved leave of absence or does not return after the leave has expired will be given a withdrawal after the seventh week of the term in which he or she fails to register.

A student who has withdrawn from the college or who has been given a withdrawal by the college registrar and who wishes to return at a later date must reapply through the Committee on Admissions for consideration along with all other applicants for admission. If the student was in academic difficulty at the time of the withdrawal, the request for readmission will be referred to the Committee on Academic Status for consideration, and that committee may stipulate criteria under which the student may be readmitted to the college.
Petition Process

The petition process permits students to request exceptions to existing regulations. Petitions are considered individually, weighing the unique situation of the petitioning student with the intent of college and university regulations.

Students can avoid the necessity to petition by carefully observing the deadlines that affect their academic program. See the Course Enrollment Changes section above for some of the important deadlines. If unsure about a deadline, check with a counselor in the Office of Student Services, N101 MVR.

Although many kinds of requests can be petitioned in the college, options other than petitioning may be preferable in some cases. To explore whether a petition is appropriate, the student may discuss the situation with a college counselor or the college registrar in the Office of Student Services.

Students may appeal petitions denied by the college registrar to the Committee on Academic Status. Students who appeal a denied petition must attach a statement from the student's faculty advisor before CAS will consider the appeal.

Two kinds of petition forms are available. The uses for both forms are described in the Human Ecology Student Guide.

General Petition Form

The general petition form is available in the Office of Student Services, N101 MVR. After completing the form, submit it to the Office of Student Services. Students learn the result of the petition process for the general petition form by checking their mail folder in the student mail center, 138 MVR.

In absentia Petition Form

The in absentia petition form is available in the Office of Student Services, N101 MVR. After completing the form, submit it to the Office of Student Services. In absentia petitions must have attached to them the catalog descriptions of the courses for which credit is requested from the other institution. In absentia petition decisions usually are sent to students via the U.S. postal service.

GRADES

See the "Grading Guidelines" section for information on the official university grading policies.

S-U Grades

Some courses in the college and in other academic units at Cornell are offered on an S-U basis; that fact is indicated in the Cornell University: Courses of Study. University regulations concerning the S-U system require that a grade of S be given for work equivalent to a C- or better; for work below that level, a U must be given. No grade point assignment is given to S, and S or U grades are not included in the computation of semester or cumulative averages. A course in which a student receives a W is, however, counted for credit. No credit is received for a U. Both the S and U grades appear on a student's record. A student who is attempting to qualify for the Dean's List must take at least 12 credits for the usual A-F grades.

Only juniors and seniors may take an S-U grade in courses in which the grade of S or U is optional; however, sophomores may take courses in which only the grade of S or U is offered. A student may take no more than four courses (or 12 credits) on an S-U basis during his or her college career; however, more than one S-U course may be taken in one semester. S-U courses may be taken only as electives or in the 15 credits required in the college outside the major unless the requirements for a specific major indicate otherwise. Freshmen enrolled in English 137 and 138 (offered for S-U grades only) are permitted to apply those courses to the freshman writing seminar requirement.

To take a course for an S-U grade, a student must check the course description to make sure that the course is offered on the S-U basis; then either sign up for S-U credit on the course enrollment form, or file an add/drop/change form in the Office of Student Services before the end of the third week of the term. After the third week of the term, students must petition the college registrar to change grade options. Forms are available in the Office of Student Services.

Grades of Incomplete

A grade of incomplete is given when a student does not complete the work for a course on time but when, in the instructor's judgment, there was a valid reason. A student with such a reason should discuss the matter with the instructor and request a grade of incomplete.

Beginning fall 1984, a grade of incomplete may remain on a student's official transcript for a maximum of two semesters and one summer after the grade is given, or until the awarding of a degree, whichever is the shorter period of time. The instructor has the option of setting a shorter time limit for completing the course work.

If the work is completed within the designated time period, the grade of incomplete will be changed to a regular grade on the student's official transcript. If work is not completed within the designated time period, the grade of incomplete will be automatically converted to an F.

When a student wants to receive a grade of incomplete, the student should arrange a conference with the instructor (preferably before classes end and the study period begins) to work out the agreement. A form, called explanation for reporting a final grade of F or incomplete, which has been signed by both the instructor and the student, must be submitted by the instructor to the Office of Student Services. This form is submitted with the final grade sheets whenever a grade of incomplete is given.

This form is for the student's protection, particularly in the event that a faculty member with whom a course is being completed leaves campus without leaving a record of the work completed in the course.

If circumstances prevent a student from being present to consult the instructor, the instructor may, if requested by the student, initiate the process by filling out and signing part of the form and returning it to the Office of Student Services with the grade sheet. Before a student will be allowed to register for succeeding semesters, he or she must go to the Office of Student Services to fill out and sign the remainder of the form.

If the work is satisfactorily completed within the required time, the course appears on the student's official transcript with an asterisk and the final grade received for the semester in which the student was registered for the course.

A student who completes the work in the required time and expects to receive a grade must take the responsibility for checking with the Office of Student Services (about two weeks after the work has been handed in) to make sure that the grade has been received. Any questions should be discussed with the course instructor.

NOTE: Grades received more than three weeks after the end of a term are NOT computed in the student's term average when computing the Dean's List. Therefore, students who feel a missing grade or a grade change will make them eligible for the Dean's List must have that grade reported to the Office of Student Services no later than the end of the third-week period of the term ended. For purposes of this rule, the last day of final exams is the last day of the term.

ACADEMIC HONORS

The college encourages high academic achievement and recognizes outstanding students in several ways.

Dean's List. Excellence in academic achievement is recognized each semester by placing on the Dean's List the names of students who have completed satisfactorily at least 12 credits with letter grades other than S or U and who have a semester grade point average of 3.5 or above. No student who has received an F or U in an academic course will be eligible.

Kappa Omicron Nu seeks to promote graduate study and research and to stimulate scholarship and leadership toward the betterment of individuals and families. As a chapter of a national honor society in the New York State College of Human Ecology, it stimulates and encourages scholarly inquiry and action on significant problems of living— at home, in the community, and throughout the world.

Students are eligible for membership if they have attained junior status and have a cumulative average of not less than B.

Transfer students are eligible after completing one year in this institution with a B average. Current members of Kappa Omicron Nu elect new members. Not more than 10 percent of the junior class may be elected to membership and not more than 20 percent of the senior class may be elected. Graduate students nominated by faculty members may be elected.

Bachelor of Science with Honors recognizes outstanding scholastic achievement in an academic field. Prospective students applying for programs whose requirements include 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. Students in other departments who wish to qualify for honors
should contact Gret Atkin, N115A Martha Van Rensselaer Hall, their sophomore year or the first semester of their junior year.

Bachelor of Science with Distinction recognizes outstanding scholastic achievement. Consideration will be given to seniors whose academic standing at the end of seven semesters is in the top 10 percent of the graduating class. The honor is conferred on those seniors who are in the top 5 percent of the class after grade point averages have been adjusted by including grades for transfer work and after grades earned in the fifth, sixth, and seventh terms have been given double weighting in the final average. The graduating class includes students who will complete requirements for Bachelor of Science degrees in January, May, or August of the same calendar year.

To be eligible for consideration, transfer students must have completed 45 credits at Cornell. In determining the academic standing of a transfer student, previous work taken at another institution is included in the computation of the student’s academic average. Names of seniors who meet these requirements are presented to the faculty of the college for approval.

The primary objectives of the honor society, Phi Kappa Phi, are to promote the pursuit of excellence in higher education and to recognize outstanding achievement by students, faculty, and others through election to membership. Phi Kappa Phi is unique in that it recognizes scholarship in all academic disciplines.

To be eligible for membership students must rank in the top ten percent of the senior class, or in the top five percent of the junior class. Provisions also exist for the election of faculty members and graduate students whose work merits recognition.

INTERDEPARTMENTAL COURSES

HE 100 Critical Reading and Thinking
Fall, spring, or summer. 2 credits.
Enrollment limited. Priority is given to freshmen and sophomores; juniors and seniors are admitted with permission of the instructor.
The objective of this course is to enable students to increase critical reading and thinking abilities. Theory and research associated with a wide range of reading, thinking, and learning skills are examined. Emphasis is placed on developing and applying analytical and evaluative skills.
Laboratory instruction is individualized and provides the opportunity to focus intensively on increasing comprehension, reading rate, and vocabulary.

HE 101 College Achievement Seminar
6-week summer session. 2 credits.
Enrollment limited to and required of Prefresher Summer Program students.
S-U grades only.
The objective of this course is to improve the study and learning skills of incoming freshmen. Emphasis is placed on acquisition of skills necessary to achieve academic success. Topics include time management, note-taking, mapping, textbook comprehension, and exam strategies.
The application of theory to the demands of Cornell course work is stressed. In addition, students are introduced to library and computing resources through hands-on projects.

THE URBAN SEMESTER PROGRAM
IN NEW YORK CITY

Sam Beck, Ph.D., director

The Urban Semester Program is a set of courses spanning the entire year. During fall and spring semesters students enroll in two separate seminars focusing on the opportunities and barriers that a multicultural society presents and their articulation with professional, community, or public policy settings (15-credit residential program).

Students intern three to four days each week and are encouraged to live in the Olin Hall dormitory of the Cornell University Medical College.

The three-week winter intercession course (1 credit) enables students to do fieldwork in New York City by working full time in community-based organizations or through research supervised by the director. In the eight-week summer semester (3 credits), students carry out research projects on the nature of professional practice by interning full time in settings of their choice. Students who seek to contribute to their own communities are encouraged to participate in any of the program offerings. Most students work with the program staff to locate internships. For further information, contact the Urban Semester Program at (212) 746-2273 or the Student Resource Center, N-139 Martha Van Rensselaer Hall.

New York City offers a wide variety of internship settings. Many bilingual and bicultural internship settings are available in Chinese, Spanish, Creole, Russian, Yiddish, and other languages. Examples of internships follow:

- **Health and medicine**—New York Hospital/Cornell Medical Center, Chinatown Health Clinic, New York City Department of Public Health, Bellevue Hospital, Queens Medical Center for Women and Children, Community Health Center.

- **Private and public law**—NOW Legal Defense and Education Fund, Neighborhood Defender Service of Harlem, Legal Aid, Puerto Rican Legal Defense and Education Fund, NAACP Legal Defense and Education Fund, Gay and Lesbian Anti-Violence Project, Kane Kessler, P.C.

- **Government and community agencies**—Women's Action Alliance, The Center for Puerto Rican Studies, New York City Commission on the Status of Women, New York City Council offices, Cornell University Cooperative Extension, New York City Department of Consumer Affairs.


- **Private not-for-profit organizations**—Grant Street Settlement House, Neighborhood Housing Services, Abyssinian Baptist Church Development Corporation, University Settlement Society of New York, Urban Development Corporation, Greater Chinatown Community Association, Lesbian and Gay Community Services Center.

- **Private and public schools**—United Federation of Teachers, Central Park East, River East, Manhattan Center for Math and Science, PS 41, City and Country, Churchill School, Little Red School House, St. Ann’s School.


HE 401 Empirical Research
Fall, spring, and summer. 1–15 credits. Permission of instructor S. Beck.

This course is available to juniors and seniors who wish to pursue a well-defined, independent research project sponsored by one or more faculty members. Honors projects are welcome. Such students must participate in the course work of HE 402, HE 406, or HE 408.

Students must provide a project proposal no longer than five pages, an annotated bibliography representing the fields of interest to be researched or explored, and a letter of approval from one faculty member who will sponsor the investigation.

HE 402 Supervised Fieldwork in Urban Affairs
Winter. 1 credit. Limited to 12 students.
Permission of instructor.

This course allows students to participate in Urban Semester Program research or internship opportunities in New York City. Research projects are carried out under the supervision of the program director and will include opportunities for field observation, interviewing, and library and archival inquiry, focused on specific learning objectives. Applications and placement information are available in the College of Human Ecology Student Resource Center, N-139 Martha Van Rensselaer Hall.

Students keep a journal that reflects on their community service experiences with a focus on specific learning objectives. Applications and placement information are available in the College of Human Ecology Student Resource Center, N-139 Martha Van Rensselaer Hall.

Applications must be accompanied by a resume, a statement of learning objectives, a letter from the placement supporting the student’s plan, and a rationale for participating in this activity. The research or community service must take place during the Cornell winter session period.

HE 403 Teaching Apprenticeship
Fall, spring, winter, and summer.
For study that includes assisting faculty with instruction. Prerequisite: Students must have taken the course (or equivalent) in which they will be assisting and have demonstrated a high level of performance.
HE 406 Fieldwork in Professional Practice: Summer in the City
Summer. 1-3 credits. 8-week session. Limited to 12 students. This is a seminar that examines the culture of professional practice, how professionals think and behave, and the role of professionals in society through internships and weekly discussions with practitioners in a variety of fields. Students will carry out fieldwork in internship placements by researching professional practice in New York City. They will intern for a minimum of eight weeks in organizations and fields such as business, government, private not-for-profit services, education, medicine and health, law, media, and communications. Students locate their own internships with assistance from the Urban Semester Program staff. Applications and placement information are available in the College of Human Ecology Student Resource Center, N-139 Martha Van Rensselaer Hall.

HE 408 The Urban Semester Program: Multicultural Issues in Urban Affairs
Fall or spring. 9-15 credits. Limited to 30-35 students, depending on housing availability. Preference given to juniors and seniors and information available in the College of Human Ecology Student Resource Center, N-139 Martha Van Rensselaer Hall. This course is a study of multicultural issues in urban affairs as students enhance their academic foundations in career development. Students examine issues of diversity (e.g., race, ethnicity, religion, class, gender, sexual orientation) in relationship to: (1) professional life in different sectors of the economy; (2) the development of neighborhoods and communities; and (3) the basis of a just and democratic society. Students intern three to four days each week and attend seminars that include site visits and discussions on multicultural issues with representatives of community, education, government, business, medical organizations and health, legal, and private not-for-profit organizations. In addition, students can enroll in a three-credit companion course offered in New York City through one of the academic departments in the College of Human Ecology.

CONSUMER ECONOMICS AND HOUSING


NOTE: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

CE&H 110 Introductory Microeconomics
Fall or spring. 3 credits. Prerequisites: CEH 110 or equivalent. Students who have taken Economics 102 or another introductory microeconomics course should not register for this course. Staff. M W F 11:15-12:05. Principles of microeconomics with an emphasis on the role of economic policies to consumers and households. Topics include individual and aggregate demand, aggregate supply, the role of money and fiscal policy in confronting the problems of inflation and unemployment, and international economics.

CE&H 210 Intermediate Microeconomics
Fall or spring. 4 credits. Prerequisite: CEH 110 or equivalent. Fall: preference to sophomores and juniors. Spring: preference to juniors and seniors. Limited to 80 students per lecture in fall and spring. Staff. T R 12:20-1:35. Fall: M W F 12:30-2:25. Spring: M W F 12:30-2:25. Theory of consumer and producer behavior including classical and indifferenee curve analyses; theories of production and cost; models for the following markets—competitive, monopoly, monopolistic competition, oligopoly, and inputs: general equilibrium; welfare economics; public goods; risk.

CE&H 226 Household and Family Demography
Spring. 3 credits. Prerequisite: RSOC 101 or equivalent. S-U grades optional. M. Rendall. T R 2:30-3:45. This course identifies important trends in U.S. household and family structure, examines the demographic, social, and economic forces behind recent changes in household structure, and evaluates current and future consequences and policy implications of these changes for both households and society. Topics include historical and contemporary trends in the size and composition of families and households, trends in marriage, divorce, remarriage, contraception, childbearing, and living arrangement patterns between household division of labor. Policy implications of all of the above are also considered.

CE&H 233 Consumers in the Market
Fall. 4 credits. Prerequisites: CEH 110 or equivalent. R. J. Avery. M W F 2:30-3:20. A study of the structure and functioning of consumer retail markets with emphasis on the role and activities of the major players in these markets—firms, consumers, and governments. The nature and consequences of various types of market failures are studied from the perspective of the firm, the consumer, and the role of government. Case studies and outside lecturers are used to impart reality to the course.

CE&H 247 Housing and Society
Spring. 3 credits. S-U grades optional. P. Chi. M W F 10:10-11:00. A survey of current issues in the American housing market 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.

Special attention is paid to the role of market structure, issues of equity and efficiency, and governmental regulation and public policy.

CE&H 111 Introductory Macroeconomics
Spring. 3 credits. Students who have taken Economics 102 or another introductory macroeconomics course should not register for this course. Staff. M W F 11:15-12:05. Principles of macroeconomics with an emphasis on the role of economic policies to consumers and households. Topics include individual and aggregate demand and aggregate supply, the role of money and fiscal policy in confronting the problems of inflation and unemployment, and international economics.

CE&H 250 Introduction to Policy Analysis
Spring. 3 credits. Prerequisite: CEH 210. N. Kutty. T R 12:20-1:35. Introduction to the tools and techniques of policy analysis. Topics covered include public finance issues, measurement of welfare loss, cost-benefit analysis, and other techniques used to evaluate public policy. This course includes a discussion of how economic and political considerations interact to produce public policy.

CE&H 300 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. Staff. Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they want to undertake, on a form available from the Student Services Office. The form, signed by the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

CE&H 307 Introduction to Econometrics
Fall. 4 credits. Prerequisites: Ag Econ 310 or equivalent. D. Lillard. M W F 10:10-11:00. The course introduces students to basic econometric principles and the use of statistical procedures in empirical studies of economic models. Assumptions, properties, and problems encountered in the use of multiple regression procedures are discussed. Students are required to specify, estimate, and report the results of an empirical model. Section meets once a week.

CE&H 315 Personal Financial Management
Spring. 3 credits. Preference given to human ecology students; limit 200, not open to freshmen. S-U grades optional. R. Heck. M W F 10:10-11:00. The study of personal financial management at various income levels and during different stages of the family life span. Course topics include financial management: frameworks and decision-making processes, basic economic and financial principles, returns to human resources, income and wealth analysis, the role of consumer and mortgage credit, financial solvency and counseling, expenditure and purchase analyses, the use of budgets and record keeping in achieving family economic goals, economic risks and available protection, retirement and estate planning, and alternative forms of savings and investments.

CE&H & PA 320 Economics of Family Policy—Adults
Fall. 4 credits. Limited to 40 students. Junior or senior standing; non-CEH or PA majors by permission of instructor. Staff. M W F 11:25-2:15. Fall: M W F 11:25-2:15. This course examines the economics of family policy issues that have a particular impact on adult family members. Emphasis in this course is on the economic behavior surrounding the policy and the incentives set up by the policy. Policies considered include marriage and divorce, family leave policy, policies assisting single parents, and policies affecting caregiving.

CE&H & PA 320 Economics of Family Policy—Adults
Fall. 4 credits. Limited to 40 students. Junior or senior standing; non-CEH or PA majors by permission of instructor. Staff. M W F 11:25-2:15. Fall: M W F 11:25-2:15. This course examines the economics of family policy issues that have a particular impact on adult family members. Emphasis in this course is on the economic behavior surrounding the policy and the incentives set up by the policy. Policies considered include marriage and divorce, family leave policy, policies assisting single parents, and policies affecting caregiving.
CE&H 321  Economics of Family Policy—Children
Spring. 4 credits. Limited to 40 students. Junior or senior standing; non-CEH or PA majors by permission of instructor. J. Green. T R 10:10–11:25.
This course examines the economics of family policy issues that particularly affect children. This course focuses on a) the economic behavior that generates the policies and b) the economic incentives and behaviors that result from the policies. Topics include child welfare, education, day care provision, child support, and adoption.

CE&H 325  Economic Organization of the Household
Fall. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional. W. K. Bryant. T R 10:10–11:25.
Economic models are used to help explain a wide variety of family and individual behavior. Topics include the demand for consumer goods and services; consumption and saving; time allocation within the household including labor supply, household production and leisure; human capital investment; fertility; marriage and divorce. Within each topic, uses of the material by public- and private-sector decision makers are discussed.

CE&H 330  The Economics of Consumer Policy
Fall. 4 credits. Open to juniors, seniors, and graduate students. Prerequisites: CEH 110, 111 and 210 or permission of instructor. Class packets on sale at Campus Store. D. Lillard. T R 1:25–2:40.
Students are introduced to the basic approaches to consumer policy and perform economic analyses of specific consumer policy issues. Three specific areas of policy intervention are addressed: externalities and public goods; anti-trust and regulation of “natural” monopolies; and markets characterized by imperfect information. Policy discussions are reinforced through the use of specific real-world examples. Students are required to write three short papers on each area of policy intervention discussed in class.

CE&H 348  Urban Economics and Policy
Spring. 4 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional. N. Kutty. T 2:30–3:45.
This course explores the economics of cities and urban problems. The course starts by studying the location choices of firms and households. The remainder of the course is spent using these insights, as well as standard economic theory, to gain an understanding of urban problems—poverty, housing, transportation, education, and crime. An analysis of existing and proposed public policies is an important component of the course.

CE&H 355  Wealth and Income
Fall. 3 credits. Open to sophomores, juniors, and seniors; graduate students may elect to audit and write a research paper for 1 to 2 credits under CEH 600.
The wealth and income positions of American households are defined and described and their economic determinants discussed along with the impacts of tax and expenditure policies and the economics of the political positions for and against such policies.

CE&H 356  The Economics of Welfare Policy
Spring. 4 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional. M W F 9:05–9:55.
Using the tools of economics, this course examines welfare policy. Included are an examination of which populations are affected, what behavior various policies are likely to engender, and how much income redistribution occurs as a result of various welfare policies. Also evaluated are various proposals for welfare reform.

CE&H 365  Economics of Consumer Law
Spring. 3 credits. Prerequisite: CEH 110 or equivalent. S-U grades optional. A. Mathios. M W F 11:15–12:05.
Economic analysis of the roles played by the courts and by federal and state regulatory legislation in altering consumer markets, consumer behavior, and consumer welfare. Topics include economic analyses of contract law, products liability, accident law and antitrust law, as well as an examination of the roles played by such agencies as the Federal Trade Commission, the Food and Drug Administration, and the Consumer Product Safety Commission.

CE&H 400–401–402  Special Studies for Undergraduates
Fall and spring. Credits to be arranged. S-U grades optional. 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 multiplicity description of the study they want to undertake, on a form available from the Student Services Office. This form must be signed by the instructor directing the study and the department chair and filed at course work in the department or elsewhere at the university. Students prepare a study form for the department chair is necessary. Students, in consultation with their faculty supervisor, should register for one of the following subdivisions of independent study:

CE&H 400  Directed Readings
For study that predominantly involves library research and independent reading.

CE&H 401  Empirical Research
For study that predominantly involves data collection and analysis.

CE&H 402  Supervised Fieldwork
For study that involves both responsible participation in data collection and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

CE&H 434  Financial and Credit Markets and Policy
This course studies the structure of financial markets in the United States. A number of different markets and institutions will be examined including: banks, savings and loans, insurance companies, pension funds, government bond markets, credit unions, and finance companies. The principles underlying government regulation of these institutions will be explored, as well as management problems and concerns. The emphasis will be on learning the institutional environment, not on personal finance.

CE&H 435  Families in Business
Spring. 3 credits. Prerequisites: Ag Econ 310 or permission of instructor. S-U grades optional. R. Heck. T R 10:10–11:25.
This course explores the economic impacts and implications of business viability for the family involved in a business. Topics include an overview of families who own a business, profiles of their businesses, use of resources for the family and the businesses, unpaid transfers made within the family for the business, economic well-being measures for the family and the business, and the transfer of wealth and business ownership among family members and business generations. Topics are explored relative to stages of business activity including feasibility, start-up, ongoing maintenance, expansion of direction, and exit or transfer. The course also surveys the conceptual issues and methodological approaches and issues related to the study of family-owned businesses.

CE&H 436  Empirical Research on Family Owned Businesses
Allows students to develop research skills by providing opportunities for hands-on survey and fieldwork. Topics and activities include research design, sampling, questionnaire development, and statistical analyses related to family-owned businesses; critical review of current research approaches and extent databases used to research business ownership; and implementation and completion of an actual survey of fieldwork projects of selected family business owners and the use of extent databases for descriptive analyses of family-owned businesses.

CE&H 444  Housing for the Elderly
Fall. 3 credits. Prerequisite: CEH 247 or permission of instructor. S-U grades optional. P. Chi. T 2:30–4:30.
This is a service-based seminar that will allow students to explore, through a wide range of service experiences, the different ways community agencies assist older adults to remain independent in such diversified residential settings as planned retirement housing, subsidized housing for the low-income elderly, home-sharing projects, ECHO housing, accessory apartments, shared group living projects, and continuing care retirement communities. This semester will focus on how the residential environment influences the ability of older adults to function independently and impacts their need for services. Throughout the seminar, students will be asked to reflect critically on how their service experience complements, challenges, or extends the course curriculum. The seminar will meet every week for 2 hours. Students are also required to have 4–6 hours of service a week, 4 during the weeks the seminar meets and 6 during the other weeks.

CE&H 446  Housing Demography
Fall. 3 credits. Prerequisite: CEH 247 and one course in statistics or permission of instructor. S-U grades optional. Not offered 1995–96. P. Chi.
This course focuses on the interface between population and housing from different vantage points. From a housing perspective, the subjects covered in this course include (1) empirical assessment of housing quality and affordability; (2) social, demographic, and health effects of housing environment; (3) housing filtering and spatial patterns. From a population perspective, the emphasis is on (1) household composition and housing adjustments, (2) household formation and future housing needs, and (3) housing issues for special population groups.

**CE&H 448 Empirical Research In Housing and Mortgage Markets**

Fall. 4 credits. Prerequisites: CEH 210 and Ag Econ 310 or the equivalent. Not open to freshmen and sophomores. Not offered 1995–96. R. B. Avery.

The purpose of this course is to provide students with the opportunity to actively engage in empirical research. Using data from the 1980 Census, the class will conduct a small-scale research project on a public policy issue.

**CE&H 485 Evaluation of Public Policies**

Fall. 3 credits. Prerequisites: CEH 110, 210, 250, or equivalent and an introductory statistics course. D. Kenkel.

TR 12:20-1:35.

This course aims at providing an understanding of the theory and practice of evaluation research. The introductory section of the course examines the rationale for government intervention in market economy. The main section of the course focuses on various techniques of evaluation research. The following techniques will be covered: (i) Benefit-cost analysis; (ii) cost-effectiveness analysis; (iii) non-experimental and quasi-experimental design for impact assessment (including multivariate regression analysis); and (iv) experimental designs for impact assessment. The concepts of causal inference and validity will also be studied. In this course, the theoretical concepts of evaluation research will be illustrated with ample examples of actual policy evaluations. The course involves an all-day trip to Albany on a working weekday for interface with evaluation staff at NY State agencies as a part of a class project.

**CE&H 600 Special Problems for Graduate Students**

Fall and spring. S-U grades optional.

Staff. Independent advanced work by graduate students recommended by their chair and approved by the department chair and the instructor.

**CE&H 601 Research Workshop in Consumer Economics and Housing**

Fall and spring. 1–3 credits. S-U grades only.

Staff. Research seminar designed to provide a forum for graduate students in consumer economics and housing to present their own thesis research at an early stage and to provide critical input for other graduate students.

**CE&H 606 Demographic Techniques**


This course provides an introduction to the methods, measures, and data used in the analysis of human populations. Topics include demographic rates, life-table analysis, cohort vs. period analysis, sources and quality of demographic data, population estimation and projection, and stable population models.

**CE&H 607 Econometric Topics**

Fall. 3 credits. S-U grades only. Prerequisite: Ag Econ 710 or equivalent. Offered alternate years. Not offered 1995–96. An advanced econometric course consisting of two separate modules. The first module will cover household survey methodology including sample design, questionnaire development, data weighing, and imputation. The second module will focus on limited dependent variable models. Linear probability, logistic probit, and tobit models will be examined as well as problems of sample section bias.

**CE&H 613 Economics of Consumer Demand**

Fall. 3 credits. Prerequisite: CEH 210, Economics 311 or 313, or concurrent enrollment in one of the three. S-U grades optional. W. K. Bryant. TR 8:40-9:55.

Introduction at the graduate level to theory and empirical research on household demand, consumption (including the use of the theory in empirical research). Topics include neo-classical theory of demand, duality, complete demand systems, demographic scaling and translating consumption and savings. At time allows, Becker and Lancaster models of demand will be introduced.

**CE&H 624 Economics of Household Behavior**

Spring. 3 credits. Prerequisite: CEH 613 or Economics 509–510 or consent of instructor. S-U grades optional. E. Peters. TR 12:20-1:35.

This course examines economic models of fertility, investment in children, family formation and dissolution, resource allocation within the household, and intergenerational transfers across households. Empirical applications of the models are presented for both developed and developing countries. Implications of the models for family policies such as child care subsidies, divorce laws, and family planning programs are also discussed.

**CE&H 627 Advanced Family Demography**


This course builds on the basic methods of dynamic population analysis covered in CEH 606. Demographic Techniques, extending them to the study of lives and populations structured not only by age and sex, but also by family status. The same or very similar methods apply to populations structured on other discrete dimensions (e.g., labor force status, region of residence, health status). Life-course analysis methods used to study the distribution of total lifetime are extended to the study of the distribution of total lifetime between family states. Methods for studying reproduction are extended to the study of kin and family sizes resulting from distributions of reproductive performance in the female population. Methods for studying individual lifetimes are also extended to the study of intersecting lifetimes, primarily through nuptiality. These are two-sex models or, more generally, models of interacting populations. Finally, household structure, fusion, and fission are studied. This combines elements of interacting-population and kin-availability modeling, plus static population-comparison methods.

**CE&H 635 Information and Regulation**

Spring. 3 credits. Prerequisite: CEH 613. Class packets on sale at Campus Store. A. Mathios. M W F 2:30-3:20.

A survey of the problems and policies accompanying informational failures and other market failures with regard to consumer wellbeing. Governmental regulation of products, of producers, of consumers, and of prices is examined. Antitrust activity, disclosure requirements, advertising restrictions, and regulatory agencies are examined in terms of their ability to serve the public interest or to serve special interests. Economic analysis, rather than institutional structure, is emphasized.

**CE&H 639 Consumer Decision Making**

Fall. 3 credits. R. J. Avery. M W F 10:10-11:00.

Individual and family decision making with respect to their market purchases will be investigated from a multidisciplinary perspective. Topics to be covered in the course include cognitive theories of information processing; theories of group interaction in decision making; and the effect of advertising, imperfect information, and uncertainty on consumer product evaluation and purchase behavior. Special attention will be given to decision making by consumers in various market segments, e.g., low-income consumers, children, and the elderly. Specific attention will be paid to how consumers in these segments process marketer-provided information and their related consumption decisions.

**CE&H 648 Housing Economics**

Spring. 3 credits. Prerequisite: CEH 210 or Economics 311 or 313. N. Kutty. M 1:25-3:55.

A survey of economic theory and empirical research related to housing markets. The course studies the demand and supply sides of the housing market as applications of microeconomic theory. Topics related to housing demand include tenure choice (decision to own or rent), household formation, mobility, and discrete choice models of housing demand. Topics on the supply side include housing starts, maintenance, and rehabilitation. Topics in housing finance such as mortgage choice, and the demand for home mortgage debt will be studied. Housing policy issues such as tax policy, housing for the elderly, fair housing, rent control, and zoning also will be addressed.

**CE&H 899 Master's Thesis and Research**

Fall and spring. Prerequisite: permission of the chair of graduate committee and instructor. S-U grades optional. Graduate faculty.

**CE&H 999 Doctoral Thesis and Research**

Fall and spring. Prerequisite: permission of the chair of graduate committee and instructor. S-U grades optional. Graduate faculty.
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DEA 150 Introduction to Human-Environment Relations
Introduction to the influence of physical environment on human behavior. Topics include environmental influences on crowding, community, crime, and friendship; environmental needs associated with characteristics such as stages in life cycle, life styles, social class, family structures, and handicaps; person-environment fit for lighting, acoustics, indoor air quality and ventilation, and thermal comfort; introduction to human factors and systems analysis; effects of environment on perception-cognition; user-responsive design; participatory design programming; and post occupancy evaluation.

DEA 201 Design III: Basic Interior Design
Fall. 4 credits. Limited to 18 students. Prerequisites: DEA 101,102, and 115 (minimum grades of B-). Recommended: DEA 111 and 150. Corequisites in DEA 203 and DEA 251 is required. Minimum cost of materials, $150; shop fee, $10; optional field trip, approximately $100; diazo machine fee, $8. J. Jennings. M W F 1:25–4:25.
Beginning interior design studio. Focus is on development of basic proficiency in interior design skills. The course is structured around a series of elementary interior and interior-product design projects of 3 to 5 weeks in length.

DEA 202 Design IV: Basic Interior Design
Spring. 4 credits. Each section limited to 18 students. Prerequisites: DEA 201 and 203. Prerequisites or corequisites: DEA 111 and 204. Minimum cost of materials, $120; diazo machine fee, $8; field trip fee. Staff. T R 12:20–1:25.
Second interior design studio. Emphasis of the course is on continued development of basic proficiency in design skills through exposure to a selected set of interior design problems of limited complexity. Each problem projects of 3 to 5 weeks duration is structured to emphasize different aspects of the design process.

DEA 203 Design Communications
Fall. 1 credit. Priority given to DEA majors. Lab fee $10. S. Danko. R 2:30–4:25.
Communication techniques for architectural and interior designers. Students study the various forms of communication used throughout the design process, from programming and conceptualization through construction documentation, and the most effective utilization of those forms. Both verbal and visual presentation methods are stressed.

DEA 204 Introduction to Building Technology
Introduction to building technology for interior design majors. Emphasis is placed on developing basic understanding of buildings and building systems and their implications for interior design and facility management. Covers basic building topics; structural systems; construction materials and methods; HVAC systems; plumbing, electrical, lighting, fire, and security systems; and telephone, computer, and other communication systems.

DEA 250 The Environment and Social Behavior
Fall. 3 credits. Prerequisite: DEA 150 or permission of instructor. Field trip fee $65. G. Evans. T R 10:10–11:10.
A combination seminar-and-lecture course for students interested in the social sciences, design, or facility management. Through projects and readings the influence of environmental form on social behaviors such as aggression, cooperation, communication, community, and crime is explored. Also covered are the influences of stage in life cycle, family structure, and social class on environmental needs and purposes. Implications for the planning, design, and management of complex environments such as offices, hospitals, schools, and housing are emphasized.

DEA 251 History and Theory of the Interior
Fall. 3 credits. Prerequisites: DEA 101 and 111. J. Jennings. M W F 9:05–9:55.
An historic study of interior architecture and design with an emphasis on the concepts of design theory. Overarching themes encompass several time periods from the classical to the twentieth century cultural patterns, spatial ideas, dialectics, design elements and theorists. Reading, discussion, analytical exercises, essays, examinations. Field trip.

DEA 300 Special Studies for Undergraduates
Fall or spring. Credit 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 multiplicity description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the head of the department, is filed at course registration or during the change-of-registration period.

DEA 301 Design V: Intermediate Interior Design
Fall. 5 credits. Prerequisites: DEA 111,150, 201, 202, 203, and 204. Corequisites: DEA 203 and 459. Minimum cost of materials, $150; shop fee, $10; optional field trip, approximately $100; diazo machine fee, $8. P. Eshelman. M W F 1:25–4:25.
Intermediate-level interior design studio. The course is organized around a series of intermediate and interior-product design projects of intermediate-level complexity, 3 to 5 weeks in duration. Focus is on development of design skills and on understanding of a selected set of generic problem types.

DEA 302 Design VI: Intermediate Interior Design
Spring. 4 credits. Prerequisites: DEA 301 and 303 or permission of instructor. Corequisites: DEA 304 and DEA 305. Minimum cost of materials, $150; shop fee, $10; diazo machine fee, $8. K. Gibson. M W F 1:25–4:25.
Intermediate-level interior design studio with an introduction to computer applications. Emphasis on using the microcomputer as a design tool in the process of creating and planning interior spaces. Continued development of design skills and problem solving in relation to a selection of problem types.
DEA 303 Introduction to Furnishings, Materials, and Finishes
Fall. 1 credit. P. Eshelman. T 2:30-4:25.
Basic understanding of furniture types and systems, interior products and equipment, such as work-stations, window, wall, and floor coverings, ceiling and lighting systems, and materials and finishes. Emphasis is placed on criteria for selection of furnishings materials and finishes for typical interior design and facility management problems.

DEA 304 Introduction to Professional Practice of Interior Design
Spring. 1 credit. A. Basinger.
T 2:30-4:25.
Introduction to organizational and management principles for delivery of interior design and facility management services. Covers basic organizational structures and basic management functions within interior design and facility management organizations, work flow and scheduling, business practices, legal and ethical responsibilities and concerns, contracts, basic contract documents such as working drawings and specifications, supervision of construction and installation, and cost estimation.

DEA 305 Construction Documents and Detailing
Spring. 3 credits. Prerequisites: DEA 301 and DEA 303. Corequisites: DEA 302 and DEA 304. Minimum cost of materials $50.
Comprehensive study of drafting, detailing, schedules, specifications. Emphasis on drawing conventions, symbols, dimensioning, detailing of interior elements, terminology, construction methods and materials.

DEA 325 Human Factors: Ergonomics-Anthropometrics
Fall. 3 credits. Recommended: A 3-credit statistics course and DEA 150. A. Hedges.
T 8 9:05-11:00.
Implications of human physical and physiological characteristics and limitations on the design of settings, products, and tasks. An introduction to engineering anthropometry, biomechanics, and the control/display design, work physiology, and motor performance. Course includes practical exercises and field project work.

DEA 349 Graphic Design
Spring. 3 credits. Enrollment limited to 18 students. Recommended: design background. Priority given to DEA majors. Approximate cost of materials, $50.
The fundamentals of lettering, typography, layout, presentation techniques and the functional and visual aspects of environmental graphics. Printing processes and the application of photography and illustration are also covered. A series of projects explores problems typical of the graphic design field, and in interior and exterior graphics, signing, and informational systems.

DEA 350 Human Factors: The Ambient Environment
Spring. 3 credits. Recommended: DEA 150. A. Hedges. T R 9:05-11:00.
An introduction to human-factors considerations in lighting, acoustics, noise control, indoor air quality and ventilation, and the thermal environment. The ambient environment is viewed as a support system that should promote human efficiency, productivity, health, and safety. Emphasis is placed on the implications for planning, design, and management of settings and facilities. Course includes a field project.

DEA 400-401-402-403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grades only.
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 multiplicity description of the study they want to undertake on a form available from the Counseling Office. This form must be signed by the instructor directing the study and the department head and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special studies form to the department head is necessary. Students, in consultation with their advisers and the instructor should register for one of the following subdivisions of independent study.

DEA 400 Directed Readings
For study that predominantly involves library research and independent reading.

DEA 401 Empirical Research
For study that predominantly involves data collection and analysis, or laboratory or studio projects.

DEA 402 Supervised Fieldwork
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

DEA 403 Teaching Apprenticeship
For study that involves teaching methods in the field and assisting faculty with instruction. Students must have demonstrated a high level of performance in the subject to be taught and in the overall academic program.

DEA 404 Design VII: Advanced Interior Design
Fall. 4 credits. Prerequisites: DEA 302, DEA 303, DEA 304, and DEA 305.
Advanced interior design studio organized around a series of interior design problems, 3 to 5 weeks in duration. Focus is on development of design skills and on competence in solving a selected set of generic interior design problem types.

DEA 405 Portfolio Preparation
Spring. 3 credits. Enrollment limited to 18.
Prerequisites: DEA 301 or permission of instructor. S-U grades optional.
Students apply graphic design principles to develop a professional portfolio of their work. Also covered are resume writing and planning the job search, and the use of appropriate computer software computer-aided graphic tools.

DEA 443 American Vernacular Interiors
Spring (even-numbered years). 3 credits.
Enrollment limited to 15 students. S-U option. Field trips $50. J. Jennings.
A topical study of nineteenth- and twentieth-century American vernacular interiors, exploring the relationship between interior design theory and social and cultural values. Sources include historic interiors, literature and art, architectural and material culture studies. Reading, discussion, comparative analysis, and critical writing.

DEA 451 Seminar in Facility Planning and Management
Fall. 1 credit. S-U grades only.
F. Becker.
M W 1:25-4:25.
Intended for students interested in the planning, design, and management of facilities for complex organizations. The purpose of the course is to explore how characteristics of the workplace, including furniture and equipment and policies governing their use and allocation, affect individual and organizational effectiveness. Special topics, such as the human implications of new information technologies and work at home, are also covered.

DEA 453 Planning and Managing the Workplace
Fall. 3 credits. Prerequisite: DEA 250 or permission of instructor. F. Becker.
T 7:30-10:30.
Intended for students interested in facility planning and management. Purpose is to provide basic tools, techniques, and concepts useful in planning, designing, and managing facilities for large, complex organizations. Covers strategic and tactical planning for facilities, organizing to deliver facility management services, project management, space forecasting, space allocation policies, programming, site selection, building assessment, space planning and design, furniture specifications, and moves. Sociopsychological, organizational, financial, architectural, and legal factors are considered.

DEA 454 Facility Planning and Management Studio
Spring. 4 credits. Prerequisites: DEA 459 or permission of instructor. Letter grades only. Minimum cost of materials, $100.
For advanced undergraduates interested in facility planning and management. Purpose is to provide basic tools, techniques, and concepts useful in planning, designing, and managing facilities for large, complex organizations. Covers strategic and tactical planning for facilities, organizing to deliver facility management services, project management, space forecasting, space allocation policies, programming, site selection, building assessment, space planning and design, furniture specifications, and moves. Sociopsychological, organizational, financial, architectural, and legal factors are considered.

DEA 455 Research Methods in Human-Environment Relations
Fall. 3 credits. Prerequisites: DEA majors only or permission of instructor, and a statistics course. G. Evans. M W F 1:25-2:15.
The course develops the student's understanding and competence in the use of research and analytical tools to study the relationship between the physical environment and human behavior. Emphasis is placed on selection of appropriate methods for specific problems and the policy implications derived from research. Topics include research methodology, unobtrusive and obtrusive data-collecting tools, the processing of qualitative and quantitative data, and effective communication of empirical research findings.
DEA 459 Programming Methods in Design
Fall. 3 credits. F. Becker. T R 11:15-1:10. Introduction to environmental programming. Emphasis on formulation of building requirements from user characteristics and limitations. Diverse methods for determining characteristics that will enable a particular environmental setting to support desired behaviors of users and operators. Methods include systems analysis, soft system, behavior circuit, behavior setting, and user characteristic approaches. Selection of appropriate methods to suit problems and creation of new methods or techniques are emphasized.

DEA 470 Environmental Analysis I: Applied Ergonomic Methods
Spring (even-numbered years). 3 credits. Prerequisite: DEA 325. A. Hedge. T R 2:30-4:00. This course covers ergonomics methods and techniques and their application to the design of modern work environments. Emphasis is placed on understanding key concepts. Coverage includes conceptual frameworks for ergonomic analysis, systems methods and processes, a repertoire of ergonomics methods and techniques of work activities and work systems. This course is the undergraduate section of DEA 670, which will share the same lectures but will meet for an additional hour. DEA 670 will have additional readings and projects.

DEA 499 Design VIII: Advanced Interior Design
Fall. 6 credits. Prerequisites: DEA 301, 302, 303, and 304. Minimum cost of materials, $150; dazio machine fee, $8 per semester. S. Danko. T R 12:20-4:25. Design-problem-solving experiences involving completion of advanced interior design problems. Problems are broken into five phases: programming; schematic design and evaluation; design development, including material and finish selection; design detailing; and in-process documentation and the preparation of a professional-quality design presentation.

DEA 600 Special Problems for Graduate Students
Fall or spring. Credit to be arranged. S-U grades optional. Department faculty. Independent advanced work by graduate students recommended by their special committee chair and approved by the head of the department and instructor.

DEA 643 American Vernacular Interiors
Spring (even-numbered years). 4 credits. Enrollment limited to 15 students. S-U option. Field trips optional. Offered 1950. J. Jennings. T R 10:10-11:30. A course intended for graduate students who want a more thorough grounding in the history of vernacular interiors than is provided by DEA 443. Each student is required to attend DEA 443 lectures, meet with the instructor and other graduate students for an additional class hour each week, and do additional readings and projects.

DEA 645 Design Process and Methods
Spring. 3 credits. Limited to 15 graduate and advanced undergraduate students. Prerequisite for undergraduates: permission of instructor. S. Danko. T 4:30-7:30. Focuses on thinking processes and techniques that support creative problem solving. Design methodologies of famous designers such as da Vinci, Ben Franklin, and Charles Eames will be examined through discussions and applications to short studio problems by the students. Topics include a historical overview of the design process and methods in both professional practice and education, creative problem-solving in management and design, perceptual blocks to creativity, and the inherent merits and pitfalls in the four realms of thinking: analytical, intuitive, synthetic, and evaluative.

DEA 648 Advanced Applications in Computer Graphics
Fall. 3 credits. Limited to 12 graduate and advanced undergraduate students. Prerequisites: DEA 301 or permission of instructor. Minimum cost of materials $150. K. Gibson. T R 9:05-12:05. Advanced use of computer technology to create and analyze interior environments. Emphasis will be on the use of 3-D modeling, animation, photorealistic rendering and emerging technologies to investigate dynamic design issues.

DEA 650 Programming Methods in Design
Fall. 4 credits. Recommended prerequisites: DEA 660, 652, and 656. F. Becker. T R 11:15-3:10. A course intended for graduate students who want a more thorough introduction to environmental programming methods than is provided by DEA 459. Each student is required to attend DEA 459 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects. See DEA 459 for more detail.

DEA 651 Human Factors: Ergonomics-Anthropometrics
Fall. 4 credits. Recommended: DEA 150 and a 3-credit statistics course. A. Hedge. T R 9:05-11:00. A course intended for graduate students who want a more thorough grounding in human factors than is provided by DEA 325. Each student is required to attend DEA 325 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects. See DEA 325 for more detail.

DEA 652 Human Factors: The Ambient Environment
Spring. 4 credits. Recommended: DEA 150. A. Hedge. T R 9:05-11:00. A course intended for graduate students who want a more thorough grounding in human factors considerations than is provided by DEA 350. Each student is required to attend DEA 350 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects. See DEA 350 for more detail.

DEA 653 Planning and Managing the Workplace
Spring. 4 credits. Prerequisite: DEA 250/600 or permission of instructor. F. Becker. M 7:30-10:50. Intended for graduate students who want a more thorough grounding in the planning, design, and management of facilities for complex organizations than is provided by DEA 453. Each student is required to attend DEA 453 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects. See DEA 453 for more detail.

DEA 654 Facility Planning and Management Studio
Spring. 4 credits. Prerequisite: DEA 459 or permission of instructor. Letter grades only. Minimum cost of materials, $100. For graduate students in facility planning and management. W. Sims. T R 1:25-4:25. For description, see DEA 454.

DEA 656 Research Methods in Human-Environment Relations
Fall. 4 credits. Prerequisites: DEA majors only or permission of instructor, and a statistics course. G. Evans. M W F 1:25-2:25. Intended for graduate students who want a more thorough understanding of the use of research to study the relationship between physical environment and behavior than is provided by DEA 455. Each student is required to attend DEA 455 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects. See DEA 455 for more detail.

DEA 659 Seminar on Facility Planning and Management
Fall. 1 credit. For graduate students and advanced undergraduates interested in careers in facility planning and management. S-U grades only. F. Becker, W. Sims. M 3:35-4:25. Series of seminars led by Cornell faculty members and other professionals directly involved in facility planning and management. Topics include strategic and tactical facility planning, space standards, project management, computer and facility management, facility maintenance and operations, energy conservation and building systems.

DEA 660 The Environment and Social Behavior
Fall. 4 credits. Prerequisite: DEA 150 or permission of instructor. Field trip fee $65. G. Evans. T R 2:30-4:00. Intended for graduate students who want a more thorough understanding of environmental form on social behavior than is provided by DEA 250. Each student is required to attend DEA 250 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects. See DEA 250 for more detail.

[DEA 668 Design Theory Seminar
Fall. 3 credits. Enrollment limited to 15 students. Staff. Not offered 1995-96. Directed toward advanced undergraduate and graduate students with interest in the theory of design. The purpose is to provide an understanding of major historical and theoretical ideas underlying design movements of the twentieth century. Explores these ideas through readings, lectures by visitors, student presentations of research papers, and seminar discussions.]

DEA 670 Environmental Analysis I: Applied Ergonomics Methods
Spring (even-numbered years). 4 credits. Enrollment limited to 20. Prerequisite: DEA 651. A. Hedge. T R 2:30-4:00. Intended for graduate students who want a more thorough understanding of applied ergonomics methods than is provided by DEA 470. Each student is required to attend DEA 470 lectures, meet with the instructor and other graduate students for an additional class each week, and do additional readings and projects. See DEA 470 for more detail.
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[DEA 671 Environmental Analysis II: Indoor Air Quality Methods]
Spring (odd-numbered years). 3 credits. Enrollment limited to 20. Prerequisite: DEA 652. A. Hodge. T R 2:30-4:00. This course provides in-depth coverage of the nature of indoor air pollutants and techniques for analyzing indoor air quality in modern work environments. Emphasis is placed on understanding key concepts in environmental exposure, toxicology, epidemiology and on understanding the procedures for assessing indoor air quality conditions. Coverage also includes detailed consideration of the design of modern ventilation systems.

[DEA 899 Master's Thesis and Research]
Fall or spring. Credits to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional. Department graduate faculty.

HUMAN DEVELOPMENT AND FAMILY STUDIES COURSES


NOTE: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

HDFS 115 Human Development
Fall or summer. 3 credits. S-U grades optional. M W F 1:25-2:15. S. Ceci. Provides a broad overview of theories, research methods, and current knowledge of human development from conception into adulthood. Course material primarily covers infancy and childhood with considerably less focus on adolescent and adult development. Topics include biological, intellectual, linguistic, social, and person-environment interactions as well as the cultural, social, and interpersonal contexts that affect developmental processes and outcomes in these domains.

HDFS 150 Families and the Life Course
Spring or summer. 3 credits. S-U grades optional. E. Wethington. M W F 1:25-2:15. This course provides an introduction to social scientific research on family roles and functions. Families are examined in regard to how they appear in U.S. history, how they change over the life course, and how they are influenced by cultural and economic forces.

HDFS 215 Human Development:
Adolescence and Youth
Spring or summer. 3 credits. Prerequisite: HDFS 115. S-U grades optional. T R 2:30-4:00. Provides a broad overview of theories, issues, and research in the study of human development from early adolescence to early adulthood (youth). Attention is focused on the interplay of biological and cognitive factors, interpersonal relationships, social structure, and cultural values in shaping the individual's development. The role of adolescence in both the individual's life course and the evolution of the culture as a whole is also considered. Familial, peer group, educational, and work contexts for development are discussed.

HDFS 218 Human Development:
Adulthood and Aging
Spring. 3 credits. Prerequisite: HDFS 115. S-U grades optional. Staff. M W F 9:05-9:55. Provides a general introduction to theories and research in adult development and aging. Psychological, social, and biological changes from youth through late adulthood are discussed. Both individual development within generations and differences among generations are emphasized.

HDFS 241 History of Childhood in the United States
Spring. Limited to 30 students. 3 credits. Not offered 1995-96. J. Brunberg. An examination of childhood and adolescence in various historical contexts: Puritan New England, slave plantations, evangelical revivals, the Western frontier, Victorian families, reform schools, high schools and colleges, the sexual revolution of the 1920s, immigrant communities, the Depression and World War II, the 1950s, and more recent social and cultural changes affecting families. Students will evaluate continuities and changes in the lives of American children as well as changing scientific ideas about children. Students have an opportunity to reflect on and write about their own childhood and adolescents. This course is designed to give students a humanities perspective on approaches to childhood central to many different disciplines.

HDFS 242 Participation with Groups of Young Children
Fall or spring. 4 credits (3 credits possible, but not recommended). Limited to 20 students (limit depends on availability of placements and of supervision). Prerequisites: HDFS 115 and permission of instructor. S-U grades optional. J. Ross-Bernstein. W 10:10-12:05. This course is designed to integrate developmental theories with supervised experience in child care centers, with the intention of enhancing the student's abilities to understand and to relate effectively with young children. Participation, observation, reflection, reading, writing, and sharing of viewpoints are some of the means used to these ends. Placements are in local nursery schools, day care centers, Head Start programs, and kindergartens.

HDFS 243 Participation with Groups of Children 6-12
Fall. 4 credits (3 credits possible, but not recommended). Limited to 20 students (limit depends on availability of placements and supervision). Prerequisites: HDFS 115 and permission of instructor during preparation. S-U grades optional. Staff. W 12:20-2:15. This course is designed to allow students to gain a working developmental perspective on the school-aged child (ages 6-12). Students will participate in area elementary schools for 6 hours per week as a classroom assistant, attend a weekly 2-hour resource and discussion seminar, and complete readings in developmental theory, current trends, and research in the study of human development. Notes: Classroom, current trends, philosophical, and person-environment interactions-major theories, basic psychometric concepts, such as reliability and validity, and methods for measuring and assessing personality.

HDFS 251 Social Gerontology: Aging and the Life Course
Spring. 3 credits. Limited to 60 students. Prerequisites: HDFS 150 or equivalent, to be determined by instructor. S-U grades optional. D. Dempster-McClain. T R 10:10-11:40. This course analyzes the social aspects of aging in contemporary American society from a life course perspective. Topics to be covered include: (1) An introduction to the field of gerontology, its history, theories, and research methods, (2) A brief overview of the physiological and psychological changes that accompany aging, (3) An analysis of the contexts (such as family, friends, social support, employment, volunteer work) in which individual aging occurs, including differences by gender, ethnicity, and social class. (4) The influences of society on the aging individual. Guest speakers will provide an introduction to various careers in the field of gerontology.

HDFS 258 Historical Development of Women as Professionals, 1800 to the Present (also Women's Studies 258 and History 238, American Studies 258)
Spring. 3 credits. S-U grades optional. Human ecology students must register for HDFS 258. Not offered 1995-96. J. Brunberg. The historical evolution of the female professions in America (midwifery, nursing, teaching, librarianship, home economics, and social work) as well as women's struggles to gain access to medicine, law, and the sciences. Lectures, reading, and discussion are geared to identifying the cultural patterns that fostered the conception of gender-specific work, and the particular historical circumstances that created these different work opportunities. The evolution of "professionalism" and the consequences of professionalism for women, family structures, and American society are also discussed.

HDFS 259 Socialization, Social Control, and Deviance across the Life Course
Spring. 5 credits. Prerequisites: HDFS 150 or Sociology 101 or Rural Sociology 101. Not offered 1995-96. Next offered spring 1997. E. Wethington. Provides an overview of sociological theories and research on how social structures, values and relationships regulate individual behavior. Theories and research on social control, crime, delinquency, and creativity are emphasized.

HDFS 260 Personality Development
Spring. 3 credits. Prerequisites: HDFS 115 or Psychology 101. Offered alternate years. Not offered 1995-96. C. Hazan. An introduction to theory and research in the area of personality psychology, with special emphasis on development. Covers major influences—such as genetic, environmental, and person-environment interactions—major theories, basic psychometric concepts, such as reliability and validity, and methods for measuring and assessing personality.
HDFS 261 The Development of Social Behavior
Spring. 3 credits. Prerequisite: HDFS 115 or Psychology 128. Offered alternate years. C. Raver. T R 12:20-1:45.
Issues in the development of social behavior are viewed from the perspective of theory and research. An attempt is made to apply our understanding of social behavior to education, childrearing, and group behavior. Likely topics include bases of social behavior in infancy and early childhood, the role of parents, siblings and peers, the development of prosocial and aggressive behavior, the development and functioning of attitude and value systems, and the function and limits of experimental research in the study of social development.

HDFS 284 Introduction to Sexual Minorities
Fall. 3 credits. Prerequisite: one social science course. S-U grades optional. R. Savin-Williams. M 7:30-10:00 p.m.
This course introduces students to theories, empirical scholarship, public policies, and current controversies with lesbian, gay, bisexual, transgender, sexual questioning, and other sexual minority populations. The major focus is on gay, lesbian, and bisexual development, lifestyles, and communities with additional emphasis on ethnic, racial, gender, and class issues. Requirements include reaction papers to the readings.

HDFS 300 Special Studies for Undergraduates
Fall or spring. Credit to be arranged. Permission required.
Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multicopy description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the coordinator of undergraduate education, is filed at course registration or during the change-of-registration period.

HDFS 313 Problematic Behavior in Adolescence
Spring. 3 credits. Prerequisite: HDFS 115 or Psychology 128. HDFS 216 recommended. J. Haugard. T R 2:30-4:00.
This course will explore several problematic behaviors of adolescence, including depression, drug abuse, eating disorders, and delinquency. Various psychological, sociological, and biological explanations for the behaviors will be presented. Appropriate research will be reviewed; treatment and prevention strategies will be explored. An optional discussion section will be available to students who would like an opportunity to discuss readings and lectures in greater depth.

HDFS 331 Learning in Children
Fall. 3 credits. Prerequisite: HDFS 115 or equivalent. Limited to 25 students. M. Potts. W 12:20-2:15.
Examines diverse theories and models of learning and their developmental implications for real-world situations that require learning or relearning. Considers the interrelations of learning and development and of learning and intelligence. Through fieldwork, application is made of the knowledge of learning processes in the cognitive domain and to implementation of the variables which affect learning.

HDFS 333 Cognitive Processes in Development
Spring. 3 credits. Prerequisite: HDFS 115 or equivalent. G. Suci. T R 10:10-11:40.
A survey of theories and problems in the development of selected cognitive processes: attention, perception, mediation processes, and language. The focus is on the first two years of life.

HDFS 334 The Growth of the Mind
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HDFS 635, a supplemental graduate seminar. Prerequisites: A course in human experimental psychology, statistics, or HDFS 115 or equivalent. Permission of the instructor. S-U grades optional. Offered alternate years. Not offered 1995–96. B. Lust.
In this course the fundamental issues of cognition are introduced. What is the nature of human intelligence? Logical and scientific reasoning? How is understanding developed and represented in the human mind?

HDFS 344 Infant Behavior and Development
Fall. 3 credits. Prerequisite: HDFS 115, a biology course, and a statistics course. Not open to freshmen. S. Robertson. T R 12:45–2:00.
Behavior and development from conception through the first two years after birth will be examined in traditional areas (e.g., perception, cognition, socioemotional, language, motor). The fundamental interconnectedness of these aspects of development will be strongly emphasized, as well as their relation to the biology of infant and fetal development. Topics with implications for general theories of development will be emphasized (e.g., the functional significance of early behavior, the nature of continuity and change, the role of the environment in development). Conditions which put infants at risk for poor development (e.g., premature birth, exposure to environmental toxins, maternal depression) and topics with current social, ethical, or political implications (e.g., infant day care, fetal rights) will also be considered. An emphasis on research methodology in the study of early behavior and development will be maintained throughout the course.

HDFS 346 The Role and Meaning of Play
Spring. 2 credits. Limited to 30 juniors and seniors. Prerequisite: HDFS 115. J. Ross-Bernstein. W 7:30–9:00 p.m.
The aim of this course is to examine the play of children ages three through seven. Through seminar discussions, workshops, films, and individualized research, the student will explore the meanings and validity of play in the lives of young children, the different ways that children play and the value of each, and the effect of the environment in enhancing and supporting play.

HDFS 347 Human Growth and Development: Biological and Behavioral Interactions (also Biology and Sociology 117 and Nutritional Sciences 347)
Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, and HDFS 115 or Psychology 101. Offered alternate years. Not offered 1995–96. Next offered spring 1997. S. Robertson and J. Haas.
This course is concerned with the interrelationships between physical and psychological growth and development, with particular emphasis on the latter, particularly during infancy. Intrinsic and extrinsic causes of variations in growth, including various forms of stimulation, are considered. In addition, the consequences of early growth and development on subsequent behavioral, psychological, and physical development are examined. The interaction between physical and behavioral or psychological factors is emphasized throughout the course.

HDFS 348 Advanced Participation with Children
Fall or spring. 4 or 8 credits. Limited to 20 students (limit depends on availability of placements and supervision). Prerequisites: HDFS 115 and HDFS 242, 243 or 331; and permission of instructor. Recommended: HDFS 346. S-U grades optional. J. Ross-Bernstein. T 12:20–2:15.
An advanced, supervised field-based course, designed to help students deepen and consolidate their understanding of children. Students are expected to define their own goals and assess progress with supervising teachers and instructor; to keep a journal; and to plan, carry out, and evaluate weekly activities for children in their placement. Conference group and readings focus on contexts of development and on ways to support children's personal and interpersonal learning. Each student is expected to do a presentation and paper on a self-selected topic within the scope of the class. Participation is in settings that serve typical and/or special needs children from two to ten years of age and provide education, care, or special-purpose interventions for them.

HDFS 354 Families in Cross-cultural Perspective
Spring. 3 credits. Prerequisites: HDFS 115 or HDFS 150 or Rural Sociology 101 or 102 or Anthropology 101 or 102, or equivalent. S-U grades optional. Staff. M W F 10:10–11:00.
This course will be taught with an emphasis on the life cycle of families and individuals. Focus will be on the rites/rituals, both subtle and obvious, that mark an individual's movement through the stages of life. The approach will be both anthropological and historical. Students will see correlations between diverse family forms in the United States and around the world.
HDFS 359 American Families in Historical Perspective (also Women's Studies 357, History 359, American Studies 359)
Spring. 3 credits. Prerequisite: HDFS 150 or one 200-level social science or history course. S-U grades optional. Human ecology students must register for HDFS 359. Not offered 1995-96. J. Bramberg. This course provides an introduction to and overview of problems and issues in the historical literature on American families and the family life cycle. Reading and lectures demonstrate American family experience in the past, focusing on class, ethnicity, sex, and region as important variables. Analysis of the private world of the family deals with changing cultural conceptions of sexuality, sex roles, generational relationships, stages of life, and life events. Students are required to do a major research paper on the history of their family, covering at least two generations, and demonstrating their ability to use historical-comparative research methods, data drawn from the social sciences, and historical circumstances.

HDFS 362 Close Relationships across the Lifespan
Fall. 3 credits. Prerequisite: HDFS 115 or Psychology 101. S-U grades optional. Not offered 1995-96. C. Hazan. Examine relationships from a psychological perspective, drawing on theoretical and empirical work in developmental, clinical, and social psychology. A central goal is to define and explain the basic structure, functions, and dynamics of human relationships. Covers such topics as interpersonal attraction, mate selection, commitment, intimacy, and the role of relationships in physical and mental health.

HDFS 370 Experimental Psychopathology
Spring. 3 credits. Limited to sophomores, juniors, and seniors. Prerequisites: HDFS 115, Psychology 101, or Education 110, a course in statistics (e.g., Psych 350, Soc 301, Educ 352 or 353, Ag Ec 310 or equivalent); and an introductory biology course. Letter grades only. M. Lenneberg. T R 10:10-11:40. A research-based survey of the cognitive, emotional, and biological aspects of psychopathology across the life span. The major mental illnesses will be covered, including schizophrenia, anxiety disorders, affective disorders, and personality disorders as well as psychopathological disorders of childhood. Emphasis will be placed on the development of psychopathology, current theories and models of etiology, and intervention strategies. This course is intended to be a rigorous introduction to the scientific study of psychopathology and psychopathological development: minimal attention to psychotherapy.

HDFS 397 Experimental Child Psychology
Fall. 4 credits. Prerequisites: HDFS 115 or Psychology 101 and one course in statistics. Intended primarily for students interested in entering graduate programs involving Wertheimer research training. Limited to 16 students. L. Lee. M W 10:10-12:05. A study of experimental methodology in research with children. Includes lectures, discussions, and practical experiences covering general experimental design, statistics, and styles and strategies of working with children.

HDFS 400-401-402-403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. Enrollment limited to juniors and seniors with a minimum 3.0 G.P.A. Permission required. Prerequisites: either HDFS 115, 150, and two intermediate level HDFS courses, or four courses in psychology or sociology. S-U grades optional. 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 courses in the department or elsewhere at the university. Students prepare a multiplicity description of the study they want to undertake, on a form available from the department office in NG14. This form must be signed by the instructor directing the study and the student's faculty adviser and submitted to NG14 MVR, the Office of Undergraduate Education. After clearance that all prerequisites are met, the student picks up the form in NG14 to file at course registration or within the change-of-registration period after registration. To ensure review before the close of the period, early submission of the special studies form to the Office of Undergraduate Education is necessary. Students, in consultation with the instructor, should register for one of the following subdivisions of independent study (guidelines for each are available in NG14 Martha Van Rensselaer Hall):

HDFS 400 Directed Readings
Prerequisites: In addition to the general prerequisite courses, a statistics or methods course and at least one course directly linked to the area of study. Permission required. For study that predominantly involves library research and independent study.

HDFS 401 Empirical Research
Prerequisites: In addition to the general prerequisite courses, a statistics or methods course and at least one course directly linked to the area of study. Permission required. For study that predominantly involves data collection and analysis, or laboratory or studio projects.

HDFS 402 Supervised Fieldwork
Prerequisites: In addition to the general prerequisite courses, an observation or participation course. Permission required. For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

HDFS 403 Teaching Apprenticeship
Prerequisites: In addition to the general prerequisite courses, must have taken the course or equivalent and received a grade of B+ or higher. Permission required. For study that includes assisting faculty with instruction.

HDFS 417 Female Adolescence in Historical Perspective (also Women's Studies 438 and History 458)
Spring. 3 credits. Limited to 50 students. Prerequisites: either HDFS 115, 150, and two intermediate level HDFS courses, or four courses in psychology or sociology. Not offered 1995-96. J. Braunberg. A reading, writing, and discussion course that will attempt to answer a basic historical question that has consequence for both contemporary developmental theory and social policy: How has female adolescence in the United States changed in the past 200 years? The focus will be on the ways in which gender, class, ethnicity, and popular cultural shape adolescents' experiences. Although the required readings are primarily historical in nature, students are encouraged to think about the interaction of biology, psychology, and culture. Students are required to do a primary source research paper.

HDFS 431 Cognition and Aging
Fall. 3 credits. Enrollment limited to 25 juniors and seniors or by permission of instructor. Prerequisites: HDFS 115 OR Psychology 101 and one higher level course in cognition OR aging. A course in statistics is strongly recommended. S-U grades optional. G. Suci. T R 10:10-11:40. Literature relevant to current empirical studies aimed at cognition as a function of aging in adults will be selectively surveyed. Topics will include attention, memory, conceptualization, intelligence and wisdom. An aim will be to identify possible mechanisms that underlie observed age-related decrement in cognitive functioning as well as possible approaches to improving functioning in the aged. Students will be asked to design empirical research aimed at an aging/cognition question.

HDFS 432 Cognitive Development and Education
Spring. 3 credits. Prerequisite: HDFS 115 or equivalent. Limited to 20 students. Not offered 1995-96. M. Potts. This course defines basic cognitive processes that underlie education (for example, linguistic processes that underlie language comprehension and production; numerical processes that underlie mathematics; perceptual processes that underlie reading) and reviews research on the development and learning of these processes in children. A laboratory component focuses on assessment and facilitation of cognitive competencies as they bear on one educational subject.

HDFS 436 Language Development (also Psychology 436 and Linguistics 436)
Spring. 4 credits. Open to undergraduate and graduate students. Graduate students should also enroll in HDFS/LING 635, a supplemental graduate seminar. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. S-U grades optional. Offered alternate years. B. Lust. T R 3:30-4:25. This course surveys historical issues, methods, and research in the study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental issues of relationships between language and thought are discussed, as are the fundamental linguistic issues of the universal grammar and the biological foundations for language acquisition. The acquisition of communication systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child.
[HDFS 438 Thinking and Reasoning  Spring. 3 credits. Prerequisite: HDFS 115 or Psychology 101. Not offered 1995-96. B. Koslowski.

The course will examine problem solving and transfer, pre-causal thinking, logical thinking, practical syllagisms, causal reasoning, scientific reasoning, theories of evidence, expert vs. non-expert, and non-rational reasoning. Two general issues will run through the course: the extent to which children and adults approximate the sorts of reasoning that are described by various types of models, and the extent to which various models accurately describe the kind of thinking that is required by the types of problems and issues that arise and must be dealt with in the real world.]

HDFS 439 Cognitive Development: Infancy Through Adolescence  Fall. 3 credits. Prerequisites: HDFS 115 or Psychology 101. Letter grades only. B. Koslowski. W 2:00-4:25.

The course will be an overview of current and classic issues and research in cognitive development. Central topics of both "hard cognition" (e.g., information processing and neuropsychological functioning) and "soft cognition" (e.g., problem solving, concepts and categories) will be covered. Selected topics will be linked to methodological issues and to important social issues such as cross-cultural cognitive development and putative racial and social class differences."

HDFS 440 Internship in Educational Settings for Children  Fall or spring. 8-12 credits. Prerequisites: HDFS 115, 242, or 243 or 331 and 348. Recommended-HDFS 346. Recommended of instructor required. S-U grades optional. J. Ross-Bernstein.

Opportunity to integrate theory with practice at an advanced level and to further develop understanding of children ages two to ten and their families. Interns will function as student teachers in a preschool or elementary school classroom and participate in curriculum planning, evaluation, staff meetings, home visits, parent conferences, and parent meetings. Supervision by head teacher and instructor. Students are expected to define their own goals and to assess their progress, to do assigned and self-directed readings, and to keep a critical incident journal."

HDFS 451 Nontraditional Families and Troubled Families  Fall. 3 credits. Limited to 30 students. Prerequisites: HDFS 115 and 150. Letter grades only. J. Haugaard. T R 8:30-9:55.

This is an advanced course designed to explore the functioning of families. The first part of the course will be a family systems model and how it relates to our understanding of all families. Four types of families are then examined: two nontraditional families (e.g., adoptive families) and two troubled families (e.g., families with a chronically ill child).

[HDFS 456 Families and Social Policy  Spring. 3 credits. Prerequisites: HDFS 115 or Sociology 101, or the course in the area of the family or in sociology. S-U grades optional. Not offered 1995-96. P. Moen.

An examination of the intended and unintended effects of governmental policies, using case studies in areas such as social welfare, day care, and employment. The policy implications of changes in the structure and composition of families are also considered.]

HDFS 457 Health and Social Behavior  Fall. 3 credits. Prerequisites: HDFS 115 or HDFS 150 or EHS 101 and a course in statistics. Letter grades only. E. Wethington. M W F 10:10-11:00.

This course critically examines theories and empirical research on the relationship between social structure and physical and mental health. The lectures and readings focus on family structure, social support, and social stress, all of which are associated with physical health, mental health, and health behaviors."

[HDFS 461 The Psychology of Television  Spring or summer. 3 credits. Limited to 100 students. Preference given to juniors and seniors. Prerequisite: a developmental or psychological course; HDFS 115 or Psychology 101 preferred. Not offered 1995-96. Staff.

This course offers a historical and topical survey of the research literature regarding the influence of television. Topics include (1) the introduction of television from 1950 to 1960 and its direct effects, (2) the audience for television, (3) the content of television, (4) behavioral influences, (5) imitation, disinhibition, arousal/depersonalization, (5) the psychological research of the 1960s and 1970s; cognitive mechanisms of influence; mainstreaming and resonance; formal and role, comprehension, and perceived reality; current issues in research from 1980 on; the role of advertisements; government policies and advertisements; and television over the life span.]

HDFS 464 Sexual Minorities and Human Development  Spring. 3 credits. Limited to 15 students. Permission of instructor required. R. Savin-Williams. T 2:00-4:25.

The first half of the course covers topics of a fairly general nature regarding theoretical, research, and applied issues on sexual minorities. In the second half of the course, students will determine the content through their selection of particular topics that interest them. The success of the course depends on students feeling personally engaged and committed to the course content. Because of the multidisciplinary nature of the course, it is hoped that students from a variety of backgrounds in disciplines, gender, sexual orientation, ethnicity, race, class, and religious affiliation will feel comfortable in the course."

HDFS 466 Neurobiology of Personality and Psychopathology  Fall. 3 credits. Limited to 30 students. Prerequisites: HDFS 115 or Psychology 101, Psychology of Psychopathology (HDFS 370 or Psychology 325), a semester of biology OR biological psychology. Letter grades only. R. Depue. W 2:00-4:25.

For juniors and seniors who have an interest in the neurobiology of behavior. Course material is presented within an evolutionary biology perspective, where the development of neurobehavioral systems as a means of adapting to critical internal and external stimuli is explored. Focus is on the general role played by dopamine (dopamine, noradrenephrine, and serotonon) and opiates in personality and psychopathology. Specifically, the role of dopamine and positive emotionality, noradrenephrine and negative emotionality, and behavioral stability, and opiates and social reward-attaction is explored in the area of personality. The manner in which these neurotransmitters may also be involved in disorders of affect, anxiety, personality, obsessive-compulsion, and autism, respectively, is covered. This course will be an overview of current and classic issues and research in cognitive development. Central topics of both "hard cognition" (e.g., information processing and neuropsychological functioning) and "soft cognition" (e.g., problem solving, concepts and categories) will be covered. Selected topics will be linked to methodological issues and to important social issues such as cross-cultural cognitive development and putative racial and social class differences."

HDFS 467 Child Development and Psychopathology  Fall. 3 credits. Limited to 60 advanced-level students. Prerequisites: a basic course in psychopathology or instructor's permission. Letter grades only. J. Haugaard. T R 2:30-4:25.

This class will explore the development and process of mental, emotional, and behavioral disorders in children such as mental retardation, autism, and attention deficit disorders. Topics will include (1) the classification of mental disorders; (2) biological, psychological, and sociological theories regarding the development and maintenance of mental disorders; (3) prevalence and etiology of childhood mental disorders; and (4) therapeutic and preventative interventions. If there is sufficient enrollment, an optional discussion section will be available to those students who would like an opportunity to discuss readings and lecture material in greater depth."

HDFS 472 Typical and Atypical Intellectual Development  Spring. 3 credits. Prerequisites: HDFS 115, a course in statistics, and a course in biology. S. Ceci. TBA.

This course provides an intensive historical examination of both normal and abnormal intelligence, focusing on the arguments of contemporary views of the heritability of intelligence, brain-behavior linkages, expertise, generality, and cognitive modifiability. It concludes with an examination of current theories, with the instructor's own biocultural theory."

HDFS 482 Child Development and Social Policy  Fall. 3 credits. Enrollment limited to 25 HDFS juniors and seniors or by permission of instructor. Prerequisites: HDFS 115, HDFS 150, and a course in statistics. HDFS 260 OR 261 strongly recommended. Letter grades only. Offered alternate years. Not offered 1995-96. C. Raver.
This course focuses on research that illuminates processes of human development as a function of organism-environment interaction through the life course. Topics to be examined will be drawn from the following: the ecology of cognitive development, developmentally instigative characteristics of persons and environments; developmental processes in males and females; activity and work as developmental processes; intimate relationships as contexts of development; developmental processes in adulthood. The final selection will be responsive to student interests.

Critical examination of seminal theoretical and empirical writings on adolescent development. Empirical research on specific questions chosen by students is considered in the light of these approaches.

[HDFS 631 Cognitive Development] Fall 3 credits. Letter grades only. Offered alternate years. Not offered 1995-96. Staff. Faculty members involved in the course will present their area of specialization in cognitive development. These areas will include perception, attention, memory, language, thinking and reasoning, learning, creativity, and intelligence.


Development in infancy will be examined through a critical review of key research and theory in selected aspects of neurobehavior, perception, cognition, language, emotion, and social relationships. Theoretical issues to be considered include the role of experience in early development, sensitive periods, continuity and discontinuity in development, and the functional significance of early behavior. Some of the conditions that put infants at risk for poor development will also be considered, such as premature birth, perinatal medical complications, and exposure to environmental toxins. The course will combine perspectives from developmental psychology and psychobiology.

[HDFS 641 Early-Childhood Development and Education] Fall. 3 credits. Not offered 1995-96. M. Potts.

Survey of major issues in the theoretical and research literature of early-childhood education.


Sociological and social psychological theories and research in the area of the family are examined with reference to the relationship between the family and society, the processes of socialization and social control, the reproduction of gender and social class, and social group rates of deviance and psychological disorder.


This course is designed to provide both broad and in-depth training in the areas of social and emotional development during infancy and childhood. It will cover most of the major topic areas and theoretical orientations. Consideration will be given to basic influences on socioemotional development—biological, social, and cultural. Coverage will include normative development as well as the origins and nature of individual differences. We will explore such fundamental issues and questions as: What are emotions? What role do they play in the development and organization of personality? What are the effects of early social relationships on emotional regulation? When and how does the self-system emerge? Emphasis will be on the processes—both internal and external—that help determine the course and outcome of development.

[HDFS 670 Experimental Psychopathology] Spring. 3 credits. Prerequisite: an undergraduate course in abnormal psychology or psychopathology; a course in multivariate statistics; and substantive course work in neurobiology or related biological science. M. Lenzenweger. TBA. Overview of current theories and empirical research on functional and organically based psychological disorders. Topic areas to be covered include autism, schizophrenia, anxiety disorders, affective disorders, and personality disorders. Focus is on the developmental and etiology of psychopathology.

Topical Seminars
Seminars offered irregularly, with changing topics and instructors. Content, hours, credit, and instructors to be announced. Seminars offer concentrated study of specific theoretical and research issues.

[HDFS 618 Seminar in Adolescence and Adult Development] Topics include peer relations, parent-teen relationships, self-esteem, youth and history, work, and moral development.

[HDFS 633 Seminar on Language Development] Topics include acquisition of meaning in infancy, precursors of language in early infancy, and atypical language development.

[HDFS 635 Seminar in Cognitive Development] Topics include early attention, perception, memory, and communication. Assessment and intervention in relation to these processes will be considered when possible.

[HDFS 645 Seminar on Infancy] Topics covered in depth include the role of emotions in early development, infant stimulation and early experience, and the assessment of infant developmental competencies.

[HDFS 646 Seminar in Early-Childhood Development and Education] Topics include analysis of models and settings, design of assessment techniques, program evaluation, and early childhood in a cross-cultural context.

[HDFS 655 Seminar in Family Studies and the Life Course] Topics include the sociology of marital status, the single-parent family, work-family linkages, women and work, and families and social change.
HUMAN SERVICE STUDIES COURSES


**NOTE:** Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

**HSS 100** *Skills for Learning in the Field*

Fall and spring. 3 credits. Instructor's permission required. Open to all levels, undergraduate and graduate. Limited to 30 students. R. Bournos. T R 2:30-4:25. Students learn to be self-directed learners and to integrate theory and experience. Topics include experiential learning, participant observation, nonverbal communication, critical analysis, and empowerment. These ideas and skills are learned through participation in CLASP, an adult literacy program.

**HSS 101** *Human Services in Contemporary Society*

Fall. 3 credits. Recommended for freshmen and first-year transfer students. D. Barr. TR 10:10-11:25. A lecture and discussion course designed as an introduction to the community base of services. Current and historical human services are examined. Emphasis is placed on social services, education, health, and criminal justice. Barriers to service delivery are discussed, such as racism, sexism, classism, sexual preference, physical disability, and age. Contemporary issues that impact on service delivery will also be discussed with attention to the relationship between direct service and public policy.

**HSS 203** *Groups and Organizations*

Spring. 3 credits. Enrollment limited to 125 students. L. Street. M W F 10:10-11:00. A basic course in the social psychology of groups and human service organizations. Study of the human service organization focuses on individual, group, and organization interface in terms of such issues as the perception of roles, norms, communication, power, leadership, and other issues. Students are expected to learn about the basic concepts and propositions that provide insight into organizational issues that confront members of organizations. Exercises are used to heighten understanding of group and organizational behavior.

**HSS 210** *The Elements of Helping*

Fall and spring. 3 credits. Limited to 60 students. Priority given to HSS majors. S-U optional. Prerequisite: Attendance at first class meeting mandatory. C. Miller. M W F 1:25-2:25. An introduction to the theoretical and practical aspects of human service processes. Included is an overview of the helping relationship covering roles, characteristics, relationships, dilemmas, and career issues of helpers. The course focuses on understanding and development of helping skills. Through role playing and exercises, students deal with basics such as attending, listening, responding, empathy, respect, genuineness, and confronting. Other topics include self-awareness, learning, communication, and conflict management. The course is an overview of some of the major theories of helping. The theory base underlying principles taught in the course is general systems theory.

**HSS 225** *Education as a Human Service*

Fall and spring. 3 credits. M. Minot. M W F 11:15-12:05. An introductory course concerned with the role of the educator as a professional provider of preventive and remedial intervention through knowledge that results in intentional changes in cognitive, affective, or psychomo- tor skills of individuals. Educators, in collaboration with other human service professionals, facilitate human growth and development. The course includes an overview of educational programs that use human ecology content in schools and other selected human service delivery systems and settings. Emphasis is placed upon the competencies and responsibilities of professionals assuming the educative role.

**HSS 246** *Determinants of Behavior*

Fall. 3 credits. Prerequisites: introductory sociology and introductory psychology and HDFS 115. Enrollment limited to 45. Priority given to social work majors. B. J. Mueller. M W F 2:30-3:20. This course provides an interdisciplinary knowledge base for human service professionals. We examine social behavior in the human environment from ecological, ethnological, historical, cultural, and social system perspectives. Applications are made to professional practice at the micro level (counseling with individuals and families or other small groups) and at the macro level (social planning and policy formulation for vulnerable groups in our society).

**HSS 280** *Racism in American Society*

For description, see AS&RC 280. D. Barr.

**HSS 292** *Research Methods*

Spring. 3 credits. W. Trochim. M W 2:30-3:55. Students will learn the logic and methods of social science research and develop skill in transforming issues of interest to them into researchable questions. Readings, written assignments, and in-class exercises focus on stating hypotheses, designing studies and samples to test hypotheses, measuring variables, and simple statistical analysis. HSS majors should take no later than their junior year.

**HSS 300** *Special Studies for Undergraduates*

Fall or spring. Credit to be arranged. Special arrangement for course work to establish equivalency for training in a previous major or institution. Students prepare a multiplicity description of the study they want to undertake on a form available from the Student Services Office. This form, signed by both the instructor directing the study and the head of the department, should be filed at course registration during the change-of-registration period.
HSS 315 Human Sexuality
Spring. 3 credits. Limited to 500 students. Prerequisite: an introductory course in human development and family studies, psychology, or sociology (or equivalent social science). Recommended: one course in biology. A. Parrot.

T R 2:30-3:45.

The aim of this course is to provide students with an understanding of the interactions and interrelationships of human behavior that influence sexual development and behavior. The course will focus on the evolution of sexual norms, cross-cultural customs, and delivery of services related to sexual issues, needs, and/or problems. Future trends in sexuality will be addressed. Biological and developmental components of human sexuality will also be addressed. An understanding of the historical, social and political context of the sexual and cultural system on the development of sexual needs, standards, and values. Research and theory in human sexuality will be explored in an interdisciplinary approach drawing on human and organizational behavior, biology, history, communication arts, education, research theory, law, sociology, and psychology.

HSS 315 Human Sexuality

HSS 325 Health-care Services and the Consumer
Fall. 3 credits. Prerequisite: an introductory course in health or biology. S-U grades optional. Next offered 1996-97. A. Parrot.

T R 12:20-1:45.

This course is an introduction to health care services and the public's development in the health field that affect the availability and kinds of health services. Emphasis is placed on interrelationships between types of practitioners, institutions and agencies, and the part each can play in prevention, diagnosis, and treatment of disease and disability. Focus will include historical and current trends, quality health care, consumer issues, cultural concerns, ethical issues, politics and policies, and the contemporary problems of health care.

HSS 330 Ecology and Epidemiology of Health
Spring. 3 credits. S-U grades optional. Limited to 30 students. E. Rodriguez.

T R 10:10-11:25.

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 students and surveys the epidemiology of specific diseases such as AIDS, hepatitis, Legionnaires' disease, plague, cancer, herpes, and chlamydia. Application of epidemiology to health care will be discussed.

HSS 360 Introduction to Program Planning and Development
Fall and spring. 3 credits. M. Minot.

HSS 360 Introduction to Program Planning and Development

HSS 370 Social Welfare as a Social Institution
Fall. 3 credits. J. Allen. M W F 9:05-9:55. A philosophical and historical introduction to social welfare services. The course reviews the historical, social and political context within which social welfare programs and the profession of social work have evolved. It discusses the political and ideological processes through which public policy is formed and the ways in which policies are translated into social welfare programs. Basic issues in welfare are discussed through present program designs, public concerns, and the interrelationships and support of services in the community.

HSS 400-401-403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grades optional.

For independent study by an individual student in advanced work in a field of HSS not otherwise provided in the department or elsewhere at the university, or for study on an experimental basis with a group of students in advanced work not otherwise provided in the department or at the university. Students prepare a multiplicity description of the study they want to undertake on a form available from Student Services. This form must be signed by the instructor directing the study and the department chair and filed at course registration or within the change-of-registration period. To ensure review before the close of the course registration or change-of-registration period, early submission of the special-studies form to the chair is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

HSS 400 Directed Readings
For study that predominantly involves library research and independent readings. Directed readings may incorporate experiential learning.

HSS 401 Empirical Research
For study that predominantly involves data collection and analysis or laboratory or studio projects. Independent research may incorporate experiential learning.

HSS 403 Teaching Apprenticeship
Prerequisite: Students must have taken the course (or equivalent) in which they will be assisting and have demonstrated a high level of performance. For study that includes assisting faculty with instruction.

HSS 414 Professional Internship in Human Service Studies
Fall, spring, or summer. 4-7 credits. Limited to juniors and seniors majoring in human service studies or permission of instructor. Prerequisite: HSS 106. Pre-enrollment required. D. Tobias.

T 1:30-4:25.

Students intern for a minimum of 10 hours a week in a human service organization and attend a weekly seminar or office hours with a focus on integrating classroom and field-based learning. The course is structured as an opportunity for students to learn experientially and, at the same time, provide meaningful services to human service organizations. Interns are expected to take active roles in structuring, monitoring, and assessing their learning under the guidance of a faculty instructor.

HSS 417 Power and Empowerment in Human Services
Spring. 3 credits. Limited to 20 students. D. Barr.

T R 10:10-11:25.

The course will take a theoretical world view of power and the colonial relationship between the American ruling class and other people. The three dimensions of power will be used as the framework for analysis. The relationships among social class, race, sex, and power will be under study. In addition, the class will explore the nature of empowerment and new theories of power and empowerment.

HSS 426 Crime and Crime Policy
Fall. 3 credits. S-U grades optional. Limited to 20 juniors and seniors. L. Street.

T R 10:10-12:05.

This course is for students who are interested in understanding crime and crime-control policies. The purpose of the course is to learn how to think about crime problems in terms of their social, political, and human service contexts. The following topics are among those addressed in order to realize the objectives of the course: American culture and crime policy, criminal justice agency and system operations, criminal offending and victimization, race and crime, and community crime-control programs. These topics are examined from the vantage point of criminal justice, social justice, and public health perspectives.

HSS 465 Community Decision Making
Fall. 3 credits. S-U grades optional. A. Hahn.

T R 8:30-9:55.

This course provides an introduction to the local political environment of human service agencies and programs. Special attention is given to how community issues are raised, debated, and resolved. Topics include the roles of service providers, local government officials, social movement organizations, federal and state governments, the courts, and the news media. Previous or concurrent participation in community activities is desirable but not required.

HSS 471-472 Social Work Methods and Practice I and II
Introduction to concepts and methods used in a generalist model of social work practice. Examination of the values and ethics of professional practice. Students learn knowledge and skills for working with individuals, groups, families, organizations, and communities. Class content is integrated with concurrent supervised fieldwork. Placements are made in social agencies in Tompkins and surrounding counties. Students are expected to arrange and to pay for their own transportation.

HSS 471 Social Work Methods and Practice I
Fall. 9 credits. Limited to 25 social work students. Prerequisites: introductory psychology, sociology, and political science; one course in human development, grades of C+ or better in HSS 246 and 370, and permission of instructor. R. Bounous.

M W 10:10-12:05; lab T R 9-5.
The Graduate Program

Human service studies graduate courses are open to undergraduate students only with the instructor's permission.

The courses listed below will be taught regularly (annually or in alternate years).

HSS 600 Special Problems for Graduate Students

Fall or spring. Credits to be arranged. For students recommended by their chair and approved by the instructor in charge for independent advanced work. S-U grades optional. Department faculty.

HSS 603 Teaching Experience

Fall and spring. S-U grades optional. For students assisting faculty with instruction. The aspects of teaching and the degree of involvement may vary depending on the needs of the course and the experience of the student. Does not apply to work for which students receive financial compensation.

HSS 613 Seminar in Mental Health Services

Fall. 3 credits. Open to undergraduate seniors with instructor's approval. B. J. Mueller. T 4:00-6:30.

Using lectures, case examples, and class discussions, we will look from both administrative and clinical perspectives at the organization and delivery of mental health services to persons who are mentally ill, mentally retarded, or developmentally disabled. We will examine model programs for long-term community care and services designed to meet the special needs of ethnic/racial minorities, women, and homeless persons who are mentally ill, mentally retarded, or developmentally disabled. State/Federal partnerships will be discussed in terms of their impact on fiscal and human resources for both public and for-profit agencies.

HSS 625 Health Care Services: Consumer and Ethical Perspectives

Fall. 3-4 credits. Limited to 30 students; undergraduate students with permission of instructor. 4-credit option, may be used as Biology and Society Senior Seminar option.

A. Parrot. T 10:10-11:25; R 11:30-12:45.

The course will focus on consumer and ethical issues in the health care field today. Broad topics to be discussed include ethical standards and guidelines, health care costs and accessibility of services, government role in health care delivery, health care as a right or privilege, private industry role in health care, services for the medically indigent and elderly, practitioner burnout and training, ethics of transplant surgery and funding, reproductive technology, AIDS research and funding, animals in medical research, right to die, and baby and gritty Doe cases.

HSS 627 Legal Aspects of Health-Services Delivery

Spring. 3 credits. Prerequisites: HSS 634 or permission of instructor. S. True. T 4:00-6:30.

This course introduces principles of the law that are specifically applicable to health-scare delivery. Topics considered include the liability of hospitals and their staff and personnel for injuries to patients; medical records and disclosure of information; consent to medical and surgical procedures; responsibility for patients' personal property; collection of bills; medical staff privileges; and confidential communications.

HSS 630 Comparative Health-Care Systems: Canada, the United States, and Third World Countries

Spring. 3 credits. Open to graduate students and seniors only. J. Ford. M 7:30-10:00.

An overview of health services is given within the larger context of the social and economic development policies of several industrialized democracies and developing countries. Sociocultural, economic, and epidemiologic factors are stressed as keys to the formulation of realistic strategies. Resource allocations for health services are assessed against the backdrop of changing rates of economic growth.

HSS 631 Managed Health Delivery Systems: Primary-Ambulatory Care

Spring. 3 credits. R. Battistella. T R 2:30-3:45.

The concept of primary care is used to enhance understanding of the directions and purpose of ongoing changes in health services organization and financing. Pressures on traditional indemnity insurance and solo fee-for-service medicine are examined in the context of the transition from unmanaged to managed delivery systems. The course is divided into two parts. Part 1 examines the development of health maintenance organizations and related forms of managed care against the backdrop of larger public policy concerns. Part 2 centers on administrative- financial topics associated with the design, marketing, and operation of managed delivery systems in highly competitive markets.

Considerable attention is given to the relationship between physicians and management with respect to such subjects as medical practice styles, productivity, quality assurance, and outcome measurement. The consumer health care behavior literature is reviewed in the light of marketing strategies and utilization control objectives. Many of the managerial topics are amplified by field trips and a select group of visiting speakers.

HSS 634 Health Care Organization

Fall. 3 credits. Limited to 30 students. Prerequisite: graduate standing or permission of the instructor. J. Kuder. T R 12:20-1:35.

The course will provide an introduction at the graduate level to the organization of health providers in the United States, the interrelationships of health services, and major sources and methods of paying for care. The course will describe how health services are structured in the United States and how these different services interrelate along the continuum of care. The course will describe and analyze organization, delivery, and financing issues from a variety of perspectives using specific performance criteria (e.g., equity, quality, efficiency). Innovations by the public and private sectors in the delivery and reimbursement of health care will also be presented.

HSS 635 Field Studies in Health Administration and Planning

Fall or spring. 1-4 credits. Sloan faculty. TBA.

Students interested in developing administrative and program-planning research skills are given an opportunity to evaluate an ongoing phase of health care agency activity in the light of sound administrative practice and principles of good medical care. In planning and carrying out the research, students work closely with a skilled practicing administrator and with members of the faculty.
HSS 637 Epidemiology, Clinical Medicine, and Health Management Interface Issues
Spring. 3 credits. E. Rodriguez. T 3:45-6:15.
This course explores from an empirical and analytical framework the relationships between epidemiology, clinical medicine, and management. The course will review the epidemiology, policy issues, and treatment of selected diagnoses accounting for a significant percentage of morbidity and cost of health care services. In addition, students will have an opportunity to explore issues of resources allocation and continuous quality improvement. The format for the class is lecture, discussion, and case analysis.

HSS 638 Quality in Health Care
Spring. 1 credit. A. Kabcenell. TBA.
The quality of health services—the extent to which the appropriate and most effective care is properly administered in the least costly manner—is a topic of paramount importance to patients. But, it is a central concern of the providers and managers of health services and those who pay for care. It is also a cornerstone of health care reform. Through readings, lecture, discussion, and group work, this course will acquaint the student with the basic elements of managing quality in health care organizations including: defining quality from many perspectives; measuring performance and detecting poor quality care; traditional and progressive approaches to managing quality including Continuous Quality Improvement; and the politics of quality, both within and outside the organization.

HSS 640 Economics of Health and Medical Care
Fall. 3 credits. J. Kuder. T R 8:30-9:55.
The course is designed for graduate students who seek an understanding of the tools, vocabulary, and way of thinking of economics as it is applied to decision making in health services delivery, administration, and policy. The philosophy of the course approach is based upon the often-quoted credo of John M. Keynes: "The theory of economics does not furnish a body of settled conclusions immediate application to policy. It is a method rather than a doctrine an apparatus of the mind, a technique of thinking which helps its possessor to draw correct conclusions." The basic methods of micro-economics will be emphasized as tools to help individuals and organizations make better decisions about health services delivery, administration, financing and policy issues.

HSS 641 Health Care Financial Management I
Spring. 3 credits. J. Kuder. T 10:10-12:40.
The course is designed to give graduate students an intensive introduction to the issues and techniques in the financial management of health service organizations. Class lectures, readings, guest speakers, problems, case studies, and research for term paper/projects will all be used to get across the important points and reinforce them with examples and applications. The course emphasizes the analytical framework and the basic economic principles and knowledge and skills necessary for financial success in complex health organizations.

HSS 642 Health Care Financial Management II: Payment Systems
Spring. 3 credits. Prerequisite: HSS 641. K. Graizer. W 3:35-6:05.
The purpose of this course is to develop an understanding of the theories on which health care payment and reimbursement systems are based and the techniques through which they operate.

HSS 645 Information Resources Management in Health and Human Service Organizations
Spring. 3 credits. Prerequisite: HSS 641. K. Graizer. W 3:35-6:05.
The course focuses on the nature of decision making and decision support systems, sources of information, and the strategic management of information resources in organizations.

HSS 648 Managing Health and Human Service Organizations I
Fall. 4 credits. K. Pryor. T R 12:20-2:00.
This is the first segment of an 8-credit sequence addressing the management and leadership of health and human services organizations, with a perspective that ranges from that involved in first-line supervision to that of strategy setting at the CEO level. This course begins with a study of basics of management—communications, motivation, change management, leadership, human resources, organizational design issues, and labor relations. It then turns to the development of technical skills in the areas of problem solving, decision making, productivity measurement, resource allocation and performance measurement. The course is taught with an applied focus and utilizes a case study approach.

HSS 649 Managing Health and Human Service Organizations II
This is the second segment of an 8-credit sequence in the management and leadership of health and human services organizations. This course concentrates on strategy issues, marketing, organizational culture issues, development of mission, the management of professionals, and some aspects of roles, structure, and inter- and intra-institutional relationships in these organizations. The course is taught via a case study approach.

HSS 655 Leadership in the Human Services
Spring. 3 credits. Limited to 20 students S-U grades optional. Open to upper-level undergraduates with instructor's permission. B. J. Mueller. T R 4:00-5:15.
Students in this seminar will study human service organizations in the context of their changing economic, ecological, and technological environments, and in terms of the leadership behaviors of administrators who are making successful adaptive responses to these changes. The introduction of new organizational structures for nurturing innovation and for effecting cultural change within the work environment will be discussed from the perspective of leadership roles at various organizational levels.

Readings include both new theoretical and practical how-to-do-it guides for administrators. The seminar format provides an opportunity for simulations so that students can enact and receive feedback on their own developing leadership skills.

HSS 656 Professional Ethics and Public Policy
This course will explore current issues of ethics and public policy against a background of the theories of ethical behavior. Questions of how public officials and managers of public and non-profit agencies and private enterprises act will be examined. How do standards of ethical behavior in the professions get established? How are public policy issues with ethical implications resolved? Readings will be drawn from political philosophy, contemporary social science, and imaginative writing. Class participation is essential. Open to seniors and graduate students.

HSS 660 Social Policy and Program Planning in Human Services
An examination of the policy process with an emphasis on the work environment. The course begins with the study of problems and catalysts for the development of new and/or changed organizational structure and function, to the intergovernmental relations, and to social change at the national, regional, state, and local level. The course addresses the role of the children and adults in this new society. The structure of social service delivery will be investigated. The role of evaluation in policy planning and implementation will be underscored. Current issues in policy, such as the role of the private and voluntary sectors, interest group politics, barriers and constraints to the development of effective policies, and the respective roles of consumers, clients, and human service professionals in the policy process will also be addressed.

HSS 664 The Intergovernmental System
Fall. 3 credits. Open to seniors who have had a course in American government and to graduate students. This course will focus on the role of the federal government to the states and their respective relationships with the states. Spring. 3 credits. K. Pryor. T R 12:20-2:00.
This course provides a general introduction to the art and science of public administration with special reference to the intergovernmental process, critical issues of public policy and human service administration. Particular attention is given to national and state policy objectives, the national and state budgetary process, and local roles in implementing and influencing national and state programs. Issues of health, education, social welfare, the environment, housing, and the like are discussed.

HSS 685 Health and Welfare Policy
Fall. 3 credits. R. Battistella. T R 2:30-4:00.
Health and welfare issues are seen as reflecting alternate solutions to the broader institutional problems of allocation (economics), control (politics), and normative behavior (morality). A basic tenet is that health and welfare policy is deeply rooted in social values and the availability of economic resources. Health policy is interpreted from a multidisciplinary perspective in which change emanates from structural dynamics accompanying socioeconomic developments such as the evolution of the economy from the entrepreneurial to the managerial to the post-industrial stages, together with shifts in social and political ideology-libertarianism, welfare statism, and secular humanism.
This course is a practicum in which the class designs and conducts an evaluation of a human service program. Students are involved in all phases of the evaluation from design through the production and dissemination of a final report. Emphasis is on research methods in the social sciences. Application of knowledge developed in prerequisite courses is stressed (for example, planning and managing an evaluation, ethics, methods of data collection, data processing, and strategies for analysis and feedback of results).

[HSS 695 Strategies for Policy and Program Evaluation]
Fall. 3 credits. Prerequisites: HSS 690 and 691 or 696, or equivalent. Offered alternate years. Next offered 1996–97. J. Greene. T R 10:10–11:25.
This course examines a wide range of approaches to the evaluation of policies and programs in the human services. The approaches are examined with respect to their purposes, key audiences, and methodologies, as well as their philosophical, political, and value frameworks. Analysis of commonalities and differences across evaluation approaches are used to judge the appropriateness of a given strategy for a particular context.

[HSS 696 Qualitative Methods for Program Evaluation]
Spring. 3 credits. Prerequisites: HSS 690 and 691 or equivalent. J. Greene. T R 10:10–11:25.
This course presents a qualitative approach to applied research and the evaluation of human service programs. Topics include the epistemological assumptions underlying this approach, questions of entry into setting, methods for data collection and data analysis, reporting, confidentiality of participants, and the ethics of qualitative inquiry. The course aims to help students understand how, when, and why a qualitative approach to social inquiry can be used appropriately, effectively, and defensively.

[HSS 704–705 Internship in Human Service Studies]
Fall, spring, or summer. 1–15 credits. S–U grades optional. Graduate faculty. Internship placement in human services is determined by availability and students' academic and professional goals. Opportunities are available in public and private human service organizations at the national, state, and local levels in positions consistent with students' needs and desires. The duration of an internship is negotiated between the student and the agency, while course credit and residence units are arranged between the student and the Special Committee.

[HSS 790 Advanced Seminar in Program Evaluation]
This course is intended for students with at least three courses in evaluation (HSS 690 series or equivalent) and statistics through multiple regression. The seminar focuses on analysis and appraisal of current literature on program evaluation and evaluative research, with emphasis on the links between program evaluation and program planning and administration. The seminar is topical, addressing current issues of importance in the field.
TEXTILES AND APPAREL COURSES

A. Lemley, chair, A. Netravali, graduate faculty representative; P. Schwartz; undergraduate advising coordinator; S. Ashdown, C. C. Chu, C. Coffman, M. Govindaraj, C. Jirousek, S. K. Obendorf, A. Racine, S. Watkins

NOTE: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

TXA 114 Introduction to Computer-aided Design
Fall and spring. 3 credits. Limit 12 per lab section. Priority given to TXA and DEA students. S-U grades optional. A. Racine.

A studio course that focuses on using the microcomputer as a design tool. The command-driven AutoCAD software program is the medium of expression for creating, modifying, and plotting visual images. Students will develop two-dimensional surface designs based on historic and cultural sources. Approximate cost of supplies is $80.00. lab fee $10.

TXA 125 Art, Design, and Visual Thinking
Fall. 3 credits. S-U grades optional. C. Jirousek.

Lecs M W F 12:20-1:10.

An introduction to the visual arts and design that explores aesthetic and cross-cultural dimensions of visual experience. Augmented by slide presentations and films, lectures emphasize relationships between visual forms and technology and social, political, and cultural interpretations that distinguish works of art from other man-made objects.

TXA 145 Apparel Design I
Spring. 3 credits. Limit 44 per section. Priority given to TXA majors or students transferring into TXA. Apparel design majors should take this course during the first year. Minimum cost of materials, $125; lab fee, $10. A. Racine. Lec-T 1:25-4:25 and lab F 12:20 or lec R 1:25-4:25 and lab F 1:25.

Intensive study of principles and processes of flat-pattern design with emphasis on creative expression in children's apparel. Students develop a thorough understanding of principles and techniques needed to produce apparel.

TXA 217 Drawing the Clothed Figure
Spring. 3 credits. Enrollment limited to 18 students. Prerequisite: a basic drawing course. Priority given to apparel design students. S-U grades optional. Minimum cost of supplies $100.00. S. Watkins.

T R 9:05-12:05.

To improve the student's ability to illustrate two-dimensionally the interaction of draped fabric and the body and to develop awareness of clothing as a design medium. Emphasis is on development of techniques and skills in selected media necessary for the communication of design ideas.

TXA 235 Fibers, Fabrics, and Finishes
Fall. 3 credits. S-U grades optional. P. Schwartz.

Lecs M W F 9:05-10:00.

An introduction to fibers, fibrous materials, and dyes and finishes. Special emphasis is given to the use of fibrous materials in apparel, residential and contract interiors, and industrial applications. Topics covered include fiber properties, fabric structure, coloration of fibrous materials, dimensional stability, flammability, product specifications, and performance standards.

TXA 246 Clothing: The Portable Environment
Fall. 3 credits. Average cost of materials, $50. S. Watkins.

An introduction to the design of clothing for a variety of occupations and climates for individuals of varying ages, for sports and recreation, and for hazardous environments such as under water or outer space.

TXA 264 Apparel Design II
Fall. 4 credits. Limit 20 students. Prerequisite: TXA 145. Recommended: TXA 125 and one art or drawing course. Apparel design majors should take TXA 264 and 367 in the same academic year, preferably during the sophomore year. Minimum cost of materials, $125; lab fee, $10. S. Ashdown. M W 1:25-4:25.

This studio course examines the process of creating a three-dimensional garment from the two-dimensional fabric. Through exercises, principles and processes of draping, advanced flat pattern making, and fitting are studied. Assigned problems require the students to make judgments regarding the design process, the nature of materials, body structure, function, and fashion.

TXA 300 Special Studies for Undergraduates
Fall or spring. Credit to be arranged. Staff.

Special arrangement for course work to establish equivalency for courses not transferred from a previous major or institution. Students prepare a multiplicity description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the department chair, is filed at course registration or during the change-of-registration period.

TXA 301 Investigative Research on the Social Impact of Science (also Biology and Society 300 and Science and Technology Studies 402)
Spring. Credit to be arranged. Prerequisite: one year of science and permission of instructor. Limited to 20 students. Not offered after spring 1996. P. Taylor.

TXA 331 Apparel Production Technology
Fall. 3 credits. Prerequisites: Economics 101 and 102 or CEH 110 and 111 and an upper-division course in either apparel or textiles. M. Govindaraj.

Introduction to technical and economic aspects of textile and apparel production. Emphasis is on design and functioning of apparel manufacturing systems and their components. Analysis of efficient manufacturing methods such as Quick Response (QR), Just-in-Time (JIT) as applicable to apparel production, and use of computer technology in production and quality control will be included.

TXA 336 Fundamentals of Color and Dyeing
Fall. 3–4 credits. Prerequisite: General Natural Science Requirements. Fiber science students are required to take the lab. Lab: $15. C. C. Chu.

Lecs M W F 10:10-11:00; lab M 1:25-4:25.

Color is an extremely important and useful factor in daily life. This course will emphasize theories and scientific principles of color, providing a framework for the use of colors in design, marketing, or research. How colors are used to dye fabrics will be addressed. Although fabrics are chiefly used to illustrate color in the class, much of the information and knowledge will be useful to non-textile majors. Guest lecturers from industry will provide the practical aspects of color in business.

TXA 337 Formation and Structure of Textiles
Spring. 3 credits. Prerequisite: TXA 235.

P. Schwartz.

Lecs M W F 9:05-9:55.

This course covers the elements of technical fabric design with an emphasis on woven and knitted fabrics. Topics include structure of woven and knitted fabrics, openness, manufacturability, equivalence, and color effects.

TXA 367 Apparel Design III
Spring. 3 credits. Prerequisite: TXA 114, TXA 125, and TXA 264. Recommended: two art or drawing courses. Apparel design majors should take TXA 264 and 367 in the same academic year, preferably during the sophomore year. Minimum cost of materials, $175; lab fee, $10. A. Racine.

M W 10:10-12:05.

Intermediate apparel students prepared to challenge and refine their design skills will be presented with a variety of complex studio problems including computer-aided apparel design. The Cornell Costume Collection is used for illustration and inspiration.

TXA 375 Color and Surface Design of Textiles

Studio experience in the surface design of textiles combined with exercises in color theory. Textile projects will utilize techniques such as block printing, shibori, batik, silk painting, screen and stitchery to produce a portfolio of textile designs. Studio work will be augmented by lectures on pattern and color theory illustrated by slides and textile examples.

TXA 400-401-402-403 Special Independent Studies for Undergraduates
Fall or spring. Credits to be arranged. Staff.

S-U grades optional. For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of TXA not otherwise provided through course work in the department or elsewhere at the university. Students prepare a multiplicity description of the study they want to undertake on a form available from the Student Services office. This form must be signed by the instructor directing the study and the department chair and filed at course registration or within the change-of-registration period after registration. To ensure review before the close of the course registration or change-of-registration period, early submission of the special-studies form to the department chair is necessary. Students, in consultation with their supervisor, should register for one of the following subdivisions of independent study.

TXA 400 Directed Readings
For study that predominantly involves library research and independent reading.
TEXTILES AND APPAREL 261

TXA 401 Empirical Research
For study that predominantly involves data collection and analysis, or laboratory or studio projects.

TXA 402 Supervised Fieldwork
For study that involves both responsible participation in a community setting and reflection on that experience through discussion, reading, and writing. Academic credit is awarded for this integration of theory and practice.

TXA 403 Teaching Apprenticeships
Fall or spring. 2-4 credits. Prerequisites: student must have upperclass standing, have demonstrated a high level of performance in the subject to be taught and in the overall academic program, and have permission of the instructor and the department chair. S-U grades optional. Staff.

TXA 432 Product Quality Assessment
Spring. 3 credits. Prerequisites: TXA 235 and Statistics. Lab fee, $15. S. K. Obendorf. Lecs M W F 1:25, lab M 2:30-1:25.

This course covers evaluation of fibers, yarns, fabrics, and garments, with emphases on the meaning of standards, testing philosophy, quality control, and statistical analysis. Day-to-day tests used in textile and apparel industry will be discussed. Laboratory sections will introduce students to various test methods, data generation for analysis, and evaluation.

TXA 436 Fiber Chemistry
Spring. 3 credits. S-U grades optional. Senior and first-year graduate students. C. C. Chu. Lecs M W F 10:10-11:00. Staff.

The chemical and physical structure of several commercially important fibers, such as cotton, wool, silk, polyesters, nylons, acrylics, polyolefins and spandex and their polymerization process are discussed. The general chemical and physical properties of each will be given. Degradation reactions for certain fibers such as polyolefins and acrylics will be discussed.

TXA 439 Biomedical Materials and Devices for Human Body Repair

Survey of materials and devices for repair of injured, diseased, or aged human tissues/or organs. It includes properties of synthetic and biological materials, wound healing processes, medical devices for repair of wounds, blood vessels, hearts, joints, bones, nerves, male impotence, vision/hearing/voice, and drug control/release.

TXA 446 Apparel Design: Intermediate Functional Clothing Design
Spring. 3 credits. Prerequisites: TXA 246 and TXA 250 or permission of instructor. Minimum cost of materials, $125; lab fee, $15. Next offered 1996-97. S. Watkins.

Complex problems in functional apparel design will be studied with an emphasis on totally resilient clothing. Students will work in groups and individually to set design criteria and develop innovative solutions for current problems in protective apparel.

TXA 465 Apparel Design: Product Development and Presentation
Fall. 3 credits. Prerequisites: minimum of three drawing or art courses and TXA 367 or permission of instructor. Minimum cost of materials, $250; lab fee, $10. S. Ashdown.

Through studio problems in apparel design, students examine the influence of manufacturing technology and cost on apparel products. Garments are developed to various stages from sketches to finished samples. Some portfolio development included.

TXA 600 Special Problems for Graduate Students
Fall or spring. Credit to be arranged. S-U grades optional. Staff.

Independent advanced work by graduate students recommended by their chair and approved by the department chair and instructor.

TXA 620 Physical Properties of Fiber-Forming Polymers and Fibers
Spring. 3 credits. Prerequisite: permission of instructor. Next offered 1996-97. A. Netravali.

Formation and properties of fiber-forming polymers, rubbery, glassy, and crystalline states and their interconnection. Fiber structure, relationship between chemical structure and physical properties of manufactured and natural fibers. Mechanical, thermal, and viscoelastic properties of fibers and testing methods will be discussed.

TXA 626 The Chemistry of Textile Finishes and Dyeing
Spring. 3 credits. S-U optional. Prerequisites: TXA 336 or equivalent and organic chemistry, or permission of instructor. Next offered 1996-97. C. C. Chu.

Chemical aspects of textiles with emphasis on finishes and dyeing are discussed. Industrially important textile chemicals used for dyeing and enhancing fiber and fabric properties, such as durable press, anti-soiling, water repellency will be studied. The emphasis is on the correlation of the observed effect with chemical structure, end-use influences, interaction with fabric and fibers, sources and synthetic routes. The environmental impact of these textile chemicals and current federal regulation will be briefly discussed.

TXA 635 Special Topics in Textiles and Apparel
Fall and spring. 1-3 credits. Prerequisite: permission of instructor. Next offered 1996-97. Staff.

TXA 637 Research Seminars in Apparel Design
Fall and spring. 1 credit. S-U optional; repeat of course each semester is encouraged for all apparel design graduate students. Available to advanced undergraduate students with permission of individual instructor. Apparel Design faculty.

TXA 639 Mechanics of Fibrous Assemblies
Fall. 3 credits. Prerequisite: permission of instructor. Next offered 1996-97. P. Schwartz.

A study of the mechanics of fiber assemblies: idealized yarn and fabric models; statistical bundle theories; deformation of yarns and fabrics in tensile, shear, and compression stress; bending and buckling; and the mechanical behavior of nonwoven textile materials.

TXA 664 Human Factors: Anthropometrics and Apparel
Spring (even-numbered years). 3 credits. S-U grade optional. Limit 15. Prerequisites: permission of instructor. Open to advanced undergraduates. S. Ashdown.

Seminar course focusing on the human form and its relationship to clothing. Includes discussion of quantification of body sizes and human variation; historical, cultural, and aesthetic concepts of fit; apparel fitting techniques; national and international sizing systems and standards; impact of sizing systems on various populations (elderly, handicapped, etc.).

TXA 675 Aesthetics and Meaning in Wear
Spring. 3 credits. S-U optional. Prerequisites: TXA 125 or course in history of art, costume history, or other history. Offered alternate years. C. Jirousek.

An examination of the aesthetic and social psychological relationship between body and clothing in the context of various cultures. Students will develop a research topic to be presented orally and in a term paper and will participate in the development of an exhibition.

TXA 899 Master's Thesis and Research
Fall or spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional. Staff.

TXA 999 Doctoral Thesis and Research
Fall or spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional. Staff.

FACULTY ROSTER
HUMAN ECOLOGY - 1995-1996

Lenzenweger, Mark F., Ph.D., Yeshiva U.  
Assoc. Prof., Human Development and Family Studies

Lillard, Dean R., Ph.D., U. of Chicago.  
Asst. Prof., Consumer Economics and Housing

Lust, Barbara C., Ph.D., City U. of New York.  
Prof., Human Development and Family Studies

Mathios, Alan, Ph.D., U. of Pennsylvania.  
Assoc. Prof., Consumer Economics and Housing

Maxwell, Lorraine E., Ph.D., City U. of New York.  
Asst. Prof., Design and Environmental Analysis

McClintock, Charles, Ph.D., SUNY at Buffalo.  
Prof., Human Service Studies, Associate Dean

Mino, Marion E., Ph.D., Cornell U. Prof.,  
Human Service Studies

Moen, Phyllis, Ph.D., U. of Minnesota. Prof.,  
Human Development and Family Studies

Prof., Human Service Studies

Netravali, Anil, Ph.D., North Carolina State U.  
Assoc. Prof., Textiles and Apparel

Obendorf, Sharon K., Ph.D., Cornell U. Prof.,  
Textiles and Apparel

Parratt, Andrea, Ph.D., Cornell U. Assoc. Prof.,  
Human Service Studies

Peters, Elizabeth, Ph.D., U. of Chicago. Assoc. Prof.,  
Consumer Economics and Housing

Pillemier, Karl A., Ph.D., Brandeis U. Assoc. Prof.,  
Consumer Economics and Housing

Pollak, Patricia B., Ph.D., Syracuse U. Assoc. Prof.,  
Consumer Economics and Housing

Potts, Marion H., Ph.D., Penn State U. Prof.,  
Human Development and Family Studies

Raver, C. Cybele, Ph.D., Yale U. Asst. Prof.,  
Human Development and Family Studies

Rendall, Michael, Ph.D., Brown U. Asst. Prof.,  
Consumer Economics and Housing

Robertson, Steven S., Ph.D., Cornell U. Assoc. Prof.,  
Human Development and Family Studies

Rodriguez, Eunice, Ph.D., U. of California at Berkeley. Asst. Prof.,  
Human Service Studies

Savin-Williams, Ritch C., Ph.D., U. of Chicago. Prof.,  
Human Development and Family Studies

Schwartz, Peter, Ph.D., North Carolina State U. Prof.,  
Textiles and Apparel

Shapiro, Constance H., Ph.D., Cornell U. Prof. and Chair, Human Service Studies

Sims, William R., Ph.D., Massachusetts Inst. of Technology. Prof. and Chair, 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. Prof., Human Service Studies

Watkins, Susan M., M.S., Pennsylvania State U. Prof., Textiles and Apparel

Wethington, Elaine, Ph.D., U. of Michigan. Assoc. Prof., Human Development and Family Studies

Yerxa, Betty L., Ph.D., Syracuse U. Prof.,  
Human Service Studies
SCHOOL OF INDUSTRIAL AND LABOR RELATIONS

ADMINISTRATION
David B. Lipsky, dean
Robert Smith, associate dean, academic affairs
Ronald J. Seебer, associate dean, extension and public affairs
Jonathon Levy, assistant dean, administration
James E. McPherson, assistant dean, Office of Student Services
Gordon Law, librarian
Ronald G. Ehrenberg, director, research
Mary Murray, director, school relations
Frances Benson, director, publications
Tom Herson, director of budget
Lawrence K. Williams, graduate faculty representative
Tove Hammer, editor, Industrial and Labor Relations Review

DEGREE PROGRAMS

Industrial and Labor Relations

Degree
B.S.
M.I.L.R.
M.P.S.
M.S.
Ph.D.

THE SCHOOL

The School of Industrial and Labor Relations at Cornell (ILR) is a small school within a large university. It tries to maintain the small-college atmosphere expected of an institution that has about 630 undergraduates and approximately 140 graduate students, even as ILR students participate fully in the activities of the larger Cornell community.

When the construction of the new Ives Hall classroom building is complete, ILR students will return to modern, technologically advanced lecture halls and seminar rooms, as well as to a library enlarged in size and more useable for study. During the construction, ILR classes will meet in buildings near the Ives Hall complex of faculty and administrative offices. Lunches, receptions, parties, and activities will be organized to promote the continuing interaction of ILR students and faculty.

Almost half of the school's typical freshman class comes from the greater New York City area. Another 30 percent live in other parts of New York State. Students from other states and a few from foreign countries make up the rest of the class. Women constitute about 50 percent of recent entering classes, and minority students comprise about 25 percent of new freshmen and transfer students.

Students enrolled in the School of Industrial and Labor Relations at Cornell may take a substantial number of courses in the other six undergraduate colleges and schools of the university, including the College of Arts and Sciences. Cornell students have access to all of the libraries and other services of the university.

The school operates in four areas: (1) resident instruction, (2) extension and public service, (3) research, and (4) publications. It provides instruction to undergraduates and graduate students who are preparing for careers in the field, as well as to men and women already engaged in industrial relations activities and the general public through its Extension and Public Service Division.

The school's Conference Center, part of the extension division, initiates and hosts conferences covering the full scope of industrial and labor relations. The center provides continuing education and information to practitioners and scholars.

The Research Division develops materials for resident and extension teaching and originates studies in industrial and labor relations. The Publications Division publishes and distributes the research results.

GRADUATE DEGREES

More than 140 students on the Cornell campus are enrolled in graduate study in industrial and labor relations, one of the largest graduate fields in the university. Students may work toward the degrees of Master of Industrial and Labor Relations, Master of Professional Studies, Master of Science, and Doctor of Philosophy. For further information on graduate programs, contact the Graduate Office, School of Industrial and Labor Relations, Cornell University, 379 Ives Hall, Ithaca, NY 14853-3901.

DEPARTMENTS OF INSTRUCTION

Courses in the school are organized into six departments:

Collective Bargaining, Labor Law, and Labor History

The study of collective bargaining, labor law, and labor history focuses on employer-employee relationships and deals with such topics as human-resource planning, staffing, computer applications to personnel, personnel information systems, training, management development, performance appraisal, compensation administration, organization development, and the sociological environment of human resource management. The study of human resource policy focuses on government efforts to enhance the population's ability to be employed. Although primarily concerned with governmental measures that influence the supply of labor (for example, training, education, health, mobility, and immigration), the subject area also includes policies in private industry that relate to the demands for labor.

Economic and Social Statistics

Economic and Social Statistics includes the principles of statistical reasoning, statistical methods, and the application of statistical tools of analysis.

International and Comparative Labor Relations

International and Comparative Labor Relations is concerned with industrial and labor relations systems and labor markets in other parts of the world. Countries include those in Western Europe, as well as the newly industrializing countries in Asia and the Third World.

Labor Economics

Labor Economics deals with labor markets: that is, the institutional arrangements, terms, and conditions under which workers supply their labor and under which firms demand their labor. Faculty members are especially concerned with understanding the workings of labor markets and the effects of various public policies. The topics dealt with in courses and research include the following: analysis of the labor force, employment and unemployment, wages and related terms of employment, income distribution, income security programs, health and safety in industry, retirement, pensions and social security, economic aspects of collective bargaining, and economic demography.

Organizational Behavior

By studying individuals, groups, and organizations, and associations or organizations, persons in the field of Organizational Behavior understand human behavior within organizations as well as the actions of the organizations themselves. At the individual level of analysis, courses consider motivation, leadership, attitudes, personality, group processes, organizational change, and worker participation. At the organizational level, courses examine occupations, deviance in the work place, conflict, power, organizational design, public policy regarding organizations, and industrial conflict. The department also offers courses on research methods in organizational research and general survey courses in both psychological and sociological research.

Human Resource Studies

This department offers specialization in human resource studies. Human Resources focuses on employer-employee relationships and deals with such topics as human-resource planning, staffing, computer applications to personnel, personnel information systems, training, management development, performance appraisal, compensation administration, organization development, and the sociological environment of human resource management. The study of human resource policy focuses on government efforts to enhance the population's ability to be employed. Although primarily concerned with governmental measures that influence the supply of labor (for example, training, education, health, mobility, and immigration), the subject area also includes policies in private industry that relate to the demands for labor.
Some students elect to spend a semester in New York City, Albany, or Washington, D.C., with a chance to observe actual labor problems solving as interns in congressional offices, labor organizations, personnel offices, and state and federal agencies. For more information, see "Special Academic Programs," below.

Study abroad options are also available at a number of foreign universities. Qualified students may spend a semester or a full year studying abroad.

A number of ILR courses deal directly with today's problems and involve fieldwork in the Ithaca area and elsewhere in New York State.

The ILR program allows juniors and seniors who want to conduct their own research to receive course credit for individually directed studies if the program is supervised by a faculty member.

**Study in Absentia**

Registration in absentia enables a student to seek admission in another American institution for a semester or a year and transfer credit toward completion of the Cornell degree. This study option requires the development of a plan of study, a statement of appropriate reasons for study away from the university (e.g., availability of courses not offered at Cornell), good academic standing, approval of the plan by the director of student services, and payment of a special in absentia registration fee. Course work taken in absentia is usually not evaluated for transfer credit until the work has been completed and the student has returned to the school.

Students then submit a course syllabus and other evidence of content to the chairman of the department that might have offered the respective course, or to a counselor in the Office of Student Services if the course is more appropriate as a general elective.

**Leave of Absence or Withdrawal**

If a student desires to withdraw or to take a leave of absence from the university, an interview should be scheduled with a counselor in the Office of Student Services. Counselors will assist students in petitioning for approval of a leave of absence and in contacting the appropriate offices or departments of the university.

**Requirements for Graduation**

To earn the Cornell Bachelor of Science degree in industrial and labor relations, the student needs to successfully complete 120 credits. This requires eight terms for an average of 30 credits a year although some students accelerate their studies.

**Curriculum Changes Effective Fall 1994 for Entering Class**

**FRESHMAN YEAR**

**Fall Semester**

Freshman Writing Seminar 3
Mathematics for the Social Sciences (ILRST 110-112) 3
History of American Labor: Nineteenth Century (ILRCB 100) 3

**Spring Semester**

Freshman Writing Seminar 3
Introductory Economics 103 4
History of American Labor: Twentieth Century (ILRCB 101) 3
Social and Psychological Foundations of Organizational Behavior II (ILRST 171)* 3
Elective 3 16

**Sophomore Year**

Physical Education, Fall and Spring 3

**Sophomore Year**

Statistics II (ILRST 210) 3
Development of Economic Institutions (ILRLE 140) 3
Labor and Employment Law (ILRST 201)* 3
Distribution: Cultural Perspectives 3
Elective 3 15

**Junior and Senior Years**

Economics of Wages and Employment (ILRLE 240) 3
Distribution: Western Intellectual Tradition 3
Elective 3 15

**Junior and Senior Years**

Economic Security (ILRLE 340) 3
Collective Bargaining (ILRLE 300)* 3
Distribution: International and Comparative ILR 3
Distribution: Upper Division Writing 3
Distribution: Science and Technology 3
Advanced Organizational Behavior (ILRST 420) 3

**ILR and General Electives**

ILR Advanced Electives 3

**General Electives**—27 credit hours in no fewer than 9 courses

**Effective Curriculum for Students Enrolled as of Spring 1994**

Course or Subject Credits Term
Freshmen Seminars* 6 Fall and spring
Econ 101-102, Micro-Macroeconomics* 6 Fall and spring
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILRCB 100</td>
<td>United States Labor History in the Nineteenth Century</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>ILROB 171</td>
<td>Micro Organizational Behavior and Analysis</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>ILSST 210</td>
<td>Statistics I</td>
<td>4</td>
<td>Spring</td>
</tr>
<tr>
<td>Any two of the following:</td>
<td></td>
<td>6</td>
<td>Spring</td>
</tr>
<tr>
<td>ILRCB 101</td>
<td>United States Labor History in the Twentieth Century</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>ILRLE 140</td>
<td>Development of Economic Institutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ILROB 170</td>
<td>Micro Organizational Behavior and Analysis</td>
<td>3</td>
<td>Fall and spring</td>
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</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILRCB 201</td>
<td>Labor Relations Law and Legislation</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>ILRLE 240</td>
<td>Economics of Wages and Employment</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>ILRST 211</td>
<td>Statistics II</td>
<td>3</td>
<td>Fall</td>
</tr>
<tr>
<td>ILHR 260</td>
<td>Personnel Management</td>
<td>3</td>
<td>Fall or spring</td>
</tr>
<tr>
<td>ILRCB 200</td>
<td>Collective Bargaining</td>
<td>3</td>
<td>Spring</td>
</tr>
<tr>
<td>Ag Econ 221</td>
<td>Financial Accounting</td>
<td>3</td>
<td>Spring</td>
</tr>
<tr>
<td>ILRCB 101</td>
<td>ILRLE 140 or ILROB 170</td>
<td>3</td>
<td>Spring</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILRLE 340</td>
<td>Economic Security</td>
<td>3</td>
<td>Fall or spring</td>
</tr>
</tbody>
</table>

*College of Arts and Sciences

**Required Courses** (55 credits)

The curriculum prescribes the courses and subjects listed in the table above, to be taken in the terms indicated. In the senior year, all courses will be electives.

**Elective Courses** (65 credits)

From the courses offered by the school, students must select a minimum of 27 credits of ILR elective courses. No more than 9 of these credits may be satisfied by ILR 499, Directed Studies, or ILR 497–498, Internships, or ILR 495, Honors Program.

Undergraduates are required to select one course in the humanities and one intensive writing course (each for a minimum of three credits) from a list of designated courses.

The remaining 33 credits may be selected from the courses of any other college at Cornell, but a student who takes more than 33 credits in the endowed colleges (the College of Architecture, Art, and Planning; the College of Arts and Sciences; the Johnson Graduate School of Management; the College of Engineering; and the School of Hotel Administration) must pay for each credit taken in excess of 33, whether or not the courses are passed. For the precise fee per credit, students should call the Office of the Bursar.

The number of credits that may be taken in the endowed colleges at no additional cost to the student may be changed at any time by official action of the school.

**SCHEDULING AND ATTENDANCE**

**Schedule Changes**

Occasionally it may be necessary for a student to request changes in his or her course schedule either before a term begins or during the semester. Such requests must be directed to the Office of Student Services to avoid possible loss of academic credit.

**Class Attendance**

It is each student's responsibility to attend all scheduled classes unless approved excuses have been given by the faculty. In some courses an instructor may permit a maximum number of class absences without a grade penalty or dismissal from the course. An explanation for absence from class may occasionally be secured from the Office of Student Services in advance of the expected absence. An approved absence may be warranted by:

1) participation in authorized university activities such as athletic events, dramatic productions, or debates;
2) medical problems supported by a record of clinic or infirmary treatment;
3) serious illness or death in the immediate family;
4) other circumstances beyond the student's control.

A request for explanation of an absence should, when possible, be made to the Office of Student Services before the date of expected absence. A reported and explained absence does not relieve a student from fulfillment of academic requirements during the period of absence. The course instructor has the authority to determine what work must be completed. The office can only confirm the explanation for absence. Students should inform the Office of Student Services of any problems they have meeting course requirements.

**ACADEMIC STANDING AND GRADES**

**Academic Integrity**

In 1987 the faculty of the School of Industrial and Labor Relations approved a revised code of academic integrity. This code, while based on the Cornell University code, varies somewhat.

Absolute integrity is expected of all Cornell students in all academic undertakings. They must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or be a party to another student's failure to maintain academic integrity. The code specifically prohibits:

1. knowingly representing the work of others as one's own;
2. using or obtaining unauthorized assistance in any academic work;
3. fabricating data in laboratory or field work;
4. giving fraudulent assistance to others;
5. fabricating data in support of laboratory or field work.

Full details on the applications of those prohibitions to course work, term papers, examinations, and other situations are listed in the code. Copies are available from the Office of Student Services, 101 Ives Hall.

**Dean's List**

A Dean's List is compiled for each of the four undergraduate classes each term on the seventh day following receipt of final grades from the registrar. Eligibility for the Dean's List is determined by applying all of the following criteria:

1) achievement of a term average for freshmen of 3.3 or better, for sophomores of 3.4 or better, and for juniors and seniors of 3.6 or better;
2) a minimum course load for the term of 12 letter-graded credits;
3) completion of all courses registered for at the beginning of the term;
4) satisfaction of all good-standing requirements.

**Academic Standing**

Good standing requires that all of the following criteria be met at the end of each term:

1) an average of C- (1.7) for the semester's work, including a minimum of 8 completed and letter-graded credits;
2) no failing grades in any course, including physical education;
3) a cumulative average of C- (1.7) for all completed terms.

If at the end of any term a student fails to maintain good standing or if overall academic performance is so marginal as to endanger the possibility of meeting school and university degree requirements, his or her record is reviewed by the Committee on Academic Standards and Scholarships. The committee may issue a written warning to the student at that time. If a student does not improve after the written warning, he or she may be denied permission to register for the next term.

**Involuntary Separation from the School for Academic Reasons**

A student may be denied permission to reregister at the end of any term when he or she has failed:

1) to establish good standing after a semester on warning;
2) to maintain an average of 1.7 in any term after a previous record of warning;
3) to achieve good standing after being on warning any two previous semesters;
4) to two or more courses in one term or has a term average of 1.0 or below.

The Academic Standards and Scholarship Committee may decide to permit a student to remain on warning more than one semester if there has been significant improvement even though the cumulative average is still below 1.7.
S-U Grading Policy

An undergraduate may register to receive a final grade of S (Satisfactory) or U (Unsatisfactory) in courses that offer this option—either in the school or in other divisions of the university—subject to the following conditions:

1) The S-U option may be used in ILR and in out-of-college course electives only, not in directed studies;
2) students are limited to registering in two S-U courses a term;
3) S-U registration is limited to 4 credits for each course;
4) students registering for S-U grades must be in good standing;
5) students must fulfill the graduation requirement of 105 letter-graded credits.

ILR faculty members assign a grade of U for any grade below C- and a grade of S for any grade of C- or better. A grade of U is considered equal to an F in determining a student’s academic standing, although it is not included in the cumulative average.

No change of grading (from letter to S-U or from S-U to letter) may be made after the first three weeks of class. There are no exceptions to this restriction, and appeals will not be accepted.

Grades of Incomplete

A grade of incomplete is assigned when the course has not been completed for reasons that are acceptable to the instructor. It is understood that the work may be completed later and credit given. Instructors may grant a grade of incomplete for a limited number of clearly valid reasons, but only to students with substantial equity in a course. A firm and definite agreement on the conditions under which it may be made up must be made with the instructor. The school’s policy allows a maximum of two full terms of residence for removal of a grade of incomplete. If it is not made up within this time, the grade automatically becomes an F.

SPECIAL ACADEMIC PROGRAMS

To meet the special academic objectives of some students, the school’s faculty has established several special academic programs. For additional information, students should contact a counselor in the Office of Student Services. Counselors will explore the program of a student to help them decide if it suits their interests.

Dual Registration in the Johnson Graduate School of Management

Dual informal registration in the Johnson Graduate School of Management leads to a Bachelor of Science degree in industrial and labor relations and a master’s degree in management after five years of study and is open to students who meet the requirements of the Johnson Graduate School of Management.

Early planning by each student, preferably in the sophomore year, is desirable to ensure that students are in the very limited and selective program of the Johnson Graduate School of Management should contact the Admission Office, 310 Malott Hall, and a counselor at the Office of Student Services.

Five-Year Master of Science Degree Program

With early planning it is possible to earn the M.S. degree in a fifth year of study. This program is designed specifically for those who wish concentrated study in an area of specialization in the school for a Master of Science degree. Students considering this program should consult a counselor in the Office of Student Services after their freshman year.

Internships

The Credit Internship Program has provided students with a vivid understanding of problems in labor and industrial relations through observation and participation in “real-life” labor problem solving. A number of selected students spend a term of the junior year in Albany, New York City, or Washington, D.C., in close contact with practitioners. Their activities include independent research under direction of ILR faculty members and seminars drawing on fieldwork experience with employers, labor organizations, and government agencies. More information about this program is available from the Office of Student Services.

Honors Program

Undergraduates who are ranked in the top 20 percent of their class at the end of the junior year may propose a two-semester research project, an honors thesis, for review by the Committee on Academic Standards and Scholarships. When approved, the candidate for graduation with honors works for two semesters (for 3 credits in each term) on research, write, and then defend the thesis.

Study Abroad

Cornell students with strong academic records and the necessary preparation in required and elective courses are encouraged to consider study abroad. The university currently has agreements with universities in Germany, Israel, England, and the Scandinavian countries that permit undergraduates to register for courses while maintaining Cornell registration and financial aid for a semester or a year. Information about those opportunities may be requested from Cornell Abroad, 474 Uris Hall.

Some study abroad programs require the development of language proficiency and preparation in appropriate courses. Students should consult the Office of Student Services and Cornell Abroad in the freshman and sophomore years to be sure that they comply with the academic and procedural requirements for study abroad.

COLLECTIVE BARGAINING, LABOR LAW, AND LABOR HISTORY


ILR CB 100 Introduction to U.S. Labor History: Nineteenth Century

Fall. 3 credits. C. Daniel, I. DeVault, N. Salvatore.

This first semester of a two-semester sequence covers the major changes in the nature of work, the workforce, the institutions involved in industrial relations in the United States through the end of the nineteenth century.

ILR CB 101 Introduction to U.S. Labor History: The Twentieth Century

Spring. 3 credits. Prerequisite: ILR CB 100. C. Daniel, I. DeVault, N. Salvatore.

This second semester of a two-semester sequence covers the major changes in the nature of work, the workforce, and the institutions involved in industrial relations in the United States from the end of the nineteenth century up to the present.

ILR CB 200 Collective Bargaining

Fall and spring. 3 credits. M. Cook, R. Hebdon, H. Katz, S. Kuruvilla, L. Turner.

A comprehensive introduction to industrial relations and collective bargaining in the United States; the negotiation, scope, and day-to-day administration of contracts; the major substantive issues in bargaining, including their implication for public policy; industrial conflict; the major challenges facing unions and employers today; U.S. industrial relations in international and comparative perspective.

ILR CB 201 Labor and Employment Law

Fall. 3 credits. M. Gold, R. Lieberwitz, K. Stone.

A survey and analysis of the law governing labor relations and employee rights in the workplace. The first half of the course examines the legal framework within which collective bargaining takes place, including union organizational campaigns, negotiations for and enforcement of collective bargaining agreements, and the use of economic pressure. The second half of the course surveys additional issues of rights in employment, including such topics as employment discrimination, the developing law of “unjust dismissal,” and union democracy. Also serves as an introduction to judicial and administrative systems.

ILR CB 384 Women and Unions

Fall or spring. 4 credits. I. DeVault.

Will explore women’s participation in the United States labor movement in the nineteenth and twentieth centuries. Issues covered will include women workers’ relations with male-dominated union movements, the role of cross-class alliances of women in organizing women workers, interactions with radical parties and organizations, problems faced by women union leaders and activities, and others.


Spring. 3 credits. Prerequisites: junior or senior or permission of instructor. N. Salvatore.

Examines the history of blacks in America from Emancipation through the experience of the first generation born after slavery, with a focus on the work experience. Topics will include the restructuring of work during Reconstruction; the relationship between work and black organizational developments; between black and white workers; and the nature of work in the agricultural south and in cities throughout the nation.]
submit 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 literature, and preliminary data collection. The second semester involves completion of the data collection and preparation of the honors thesis. At the end of the second semester, the candidate is examined orally on the completed thesis by a committee consisting of the thesis supervisor, a second faculty member designated by the appropriate department chair, and a representative of the Academic Standards and Scholarship Committee.

ILRCB 497-498 Internship
Fall and spring. 4 credits. Staff.
All requests for permission to register for an internship must be approved by the faculty member who will supervise the project and the chairman of the faculty member's academic department before submission for approval by the director of Off-Campus Credit Programs. Upon approval of the internship, the Office of Student Services will register each student, and students will be graded A+ to F for individual research, and for 497, for 6 credits graded S-U, for completion of a professionally appropriate learning experience, which is graded by the faculty sponsor.

ILRCB 499 Directed Studies
Fall and spring. 3 credits.
For individual research, conducted under the direction of a member of the faculty, in a special area of labor relations not covered by regular course offerings. Registration is normally limited to seniors who have demonstrated ability to undertake independent work. Eligible students should consult a counselor in the Office of Student Services at the time of course registration to arrange for formal submission of their projects for approval by the Academic Standards and Scholarship Committee.

ILRCB 500 Collective Bargaining
Fall. 3 credits. Open only to graduate students. ILRCB 501 taken previously or concurrently.
A comprehensive introduction to the industrial relations system of the United States. The negotiation, scope, and day-to-day administration of contracts; union and employer bargaining structures; implications of industrial relations issues for U.S. competitiveness and public policy; industrial conflict. U.S. industrial relations in international and comparative perspective.

ILRCB 501 Labor and Employment Law
Fall. 3 credits. Open only to graduate students. M. Gold, R. Lieberwitz, K. Stone. A survey and analysis of the law governing labor relations and employee rights in the workplace. The first half of the course examines the legal framework within which collective bargaining takes place, including union organizational campaigns, negotiations for and enforcement of collective bargaining agreements, and the use of economic pressure. The second half of the course surveys additional issues of rights in employment, including such topics as employment discrimination, the developing law of "unjust dismissal," and union democracy. Also serves as an introduction to judicial and administrative systems.

ILRCB 502 History of Industrial Relations in the United States since 1865
Spring. 3 credits. Open only to graduate students. C. Daniel, I. DeVault, N. Salvatore. This introductory survey course emphasizes historical developments in the twentieth century. Special studies include labor union struggles over organizational alternatives and such other topics as industrial conflicts, working-class life styles, radicalism, welfare capitalism, union democracy, and the expanding authority of the federal government.

ILRCB 602 Arbitration
Fall and spring. 4 credits. Limited to 21 students. Prerequisites: undergraduates, ILRCB 200, 201 graduate students, ILRCB 500 and 501; permission of instructor. J. Gross, R. Lieberwitz.
A seminar on the role of arbitration in the field of labor-management relations, including an analysis of principles and practices, the handling of materials in briefs or oral presentation, the conduct of a mock arbitration hearing, and the preparation of arbitration opinions and post-hearing briefs.

ILRCB 605 Readings in the History of Industrial Relations in the United States
Fall. 3 credits. Limited to seniors and graduate students. Not offered 1995-96. C. Daniel, N. Salvatore. A seminar covering, intensively, original printed sources and scholarly accounts for different periods in American history.

ILRCB 606 Theories of Industrial Relations Systems
Fall or spring. 3 credits. Limited to seniors and graduate students. Prerequisites: seniors, ILRCB 100, 101, 200; graduate students, ILRCB 500. Not offered 1995-96. H. Katz. Will trace the evolution of theory and research on industrial relations. Topics include: theories of the labor movement, institutional models and evidence, trade unions and corporatist models, the origins of internal labor markets and their relationship with unionization, models of strikes, empirical assessments of arbitration, research on union decline, and the role of economic and social systems.

ILRCB 607 Values in Law, Economics, and Industrial Relations
Fall and spring. 3 credits. Limited to 21 students. Prerequisites: ILRCB 200, 201; 500, 501. J. Gross.
An examination of the open questions for a legal and economic perspective of society and the state. The course will be divided into two parts: first, the social, political, and economic factors that shape the law of employment, labor, and industrial relations; and second, the impact of labor and employment law on business and industry. Classroom discussions and student research projects will be designed to explore issues such as: employment discrimination, law, economics and the state; work and business; power, conflict and compromise; and rights and justice.

ILRCB 608 Special Topics in Collective Bargaining, Labor Law, and Legislation
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 201, graduate students, ILRCB 501. Staff.
The areas of study are determined each semester by the instructor offering the seminar.

**ILRCB 608.1 Special Topics: Labor Law**

**Policy Seminar**
Spring. 3 credits. K. Stone.
The United States collective bargaining system, which has its origins during the New Deal period, has come under intense attack. The intellectual premises of the system have been challenged by scholars on both the right and the left, and at the same time the decline in the labor movement has undermined its political support. This seminar will look at the theoretical attacks on the New Deal collective bargaining system and at some of the current proposals for its replacement. Some of the topics to be discussed: the theory of regulation embodied in the National Labor Relations Act and its critique; alternative concepts of labor markets and their policy ramifications; the emerging of the global economy and its ramifications for domestic labor regulation. There will also be discussion of alternative systems of labor regulation, such as found in West Germany, Sweden, and Japan.

**ILRCB 650 Service Work and Workers in Historical Perspective**
Fall or spring. 3 credits. Not offered 1995-96. I. DeVault. Takes a historical perspective on the development of a service economy in the United States. Readings will include general and specific theoretical texts. The course will cover recent historical scholarship on specific occupations and situations in the “nonproductive” workforce. Students will explore primary sources for research on the subject and write research papers.

**ILRCB 651 Industrial Relations in Transition**
Spring. 3 credits. Limited to seniors and graduate students. Not offered 1995-96. H. Katz. Considers whether recent developments such as concession bargaining, worker participation programs, and the growth of nonunion firms represent a fundamental transformation in industrial relations practice. Will review recent research and new theories arguing that such a transformation is occurring, including the work of Pfeffer and Sabel, Bluestone and Harrison, and Kochan, McKersie, and Katz. Will also review the counterarguments and evidence put forth by those who believe no such transformation is under way. Course material will focus on industrial relations practice in the private sector in the United States, although some attention will be paid to developments in Western Europe, the United Kingdom, and Japan.

**ILRCB 655 Employment Law**
Spring. 3 credits. Prerequisites: ILRCB 201/501. Not offered 1995-96. M. Gold. Examines a number of major federal and state laws designed to protect workers in their employment relationships. The material covered will be selected from the following: the Fair Labor Standards Act, unemployment insurance, workers' compensation, the Occupational Safety and Health Act, the Employee Retirement Income Security Act, the doctrine of employment at will, Social Security, workers' rights-to-know, plant closings, and protection of workers' privacy.

**ILRCB 682 Seminar in Labor Relations Law and Legislation**
Fall or spring. 3 credits. Limited enrollment. Prerequisite: permission of instructor. Not offered 1995-96. R. Lieberwitz. Legal problems in public employment and other areas of labor relations affecting the public interest.

**ILRCB 683 Research Seminar in the History of Industrial Relations**
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 100 and 101; graduate students, ILRCB 502. Not offered 1995-96. C. Daniel, I. DeVault, N. Salvatore. The areas of study are determined each semester by the instructor offering the seminar.

**ILRCB 684 Employment Discrimination and the Law**
Fall. 3 credits. Prerequisite: ILRCB 201/501 or equivalent. M. Gold. An examination of the laws against employment discrimination based on race, color, religion, sex, national origin, age, and disability.

**ILRCB 685 Research Seminar on Trade Unions**
Fall or spring. 3 credits. Prerequisite: ILRCB 200 or 500; permission of instructor. Not offered 1995-96. S. Kuruvilla. Designed to provide an analytical survey of issues on research on trade unions in the United States. Major topics include unions in politics, unions as complex organizations, public opinion and attitudes toward unions, determinants of union growth and decline, economic and non-economic effects of unions, internal union government, and commitment and participation in trade union activity. This is a research-oriented course.

**ILRCB 686 Collective Bargaining in the Public Sector**
Fall or spring. 3 credits. Prerequisites: undergraduates, ILRCB 200 and 201; graduate students, ILRCB 500 and 501. Not offered 1995-96. R. Hebdon. An examination of the development, practice, and extent of collective bargaining between federal, state, and local governments and their employees. The variety of legislative approaches to such matters as representation rights, unfair practices, scope of bargaining, impasse procedures, and the strike against government are considered along with implications of collective bargaining for public policy and its formulation.

**ILRCB 689 Constitutional Aspects of Labor Law**
Spring. 3 credits. Not offered 1995-96. R. Lieberwitz. In-depth analysis of the Supreme Court decisions that interpret the United States Constitution as it applies in the workplace. This study will focus on the First Amendment, Fifth Amendment, Fourteenth Amendment, and Commerce Clause, with issues including freedom of speech and association, equal protection, due process, and other issues in the area of political and civil rights. The course entails a high level of student participation in class discussion, and assignments include a research paper.

**ILRCB 703 Theory and Research in Collective Bargaining**
Spring. 3 credits. Open to graduate students who have had ILRCB 500 and ILROB 723 or their equivalents. Recommended: a statistics course beyond the level of ILRST 510. Not offered 1995-96. Staff. This is a second-level course in collective bargaining that builds on the institutional research covered in ILRCB 500. The existing literature in the area of collective bargaining is appraised for its theoretical and empirical content. Efforts are made to explore the appropriate role for theory and empirical analysis in moving research in collective bargaining toward a more analytical perspective and to identify and appraise the underlying paradigms used to study collective bargaining-related issues.

**ILRCB 704 The Economics of Collective Bargaining**
Spring. 3 credits. Prerequisites: ILRCB 500, ILRLE 540 (or their equivalents) and an understanding of multiple regression analysis; or permission of instructor. Not offered 1995-96. Staff. Focuses on both the economic analysis of unions and collective bargaining in our economy and on the economic forces that affect collective bargaining. The method is to identify and conceptualize the structural determinants of relative bargaining power. On this basis, the course examines both the economic outcomes of collective bargaining and current bargaining trends in a variety of industries. Tentative theoretical analyses of unionism (neoclassical, institutionalist) are compared. The statistical techniques and empirical results of research on the union effect on economic outcomes (wages, prices, inflation, profits, productivity, earnings inequality) are also evaluated. The effect of technology, corporate structures, and public policy on union bargaining power is outlined, and a number of case studies of collective bargaining in the private sector are reviewed. A term paper is required.

**ILRCB 705 The Economics of Collective Bargaining**
Spring or fall. 3 credits. Permission of instructor. N. Salvatore. A reading and research seminar for graduate students that focuses on selected topics in nineteenth- and twentieth-century labor history. The topic changes each semester.

**ILRCB 706 Labor Economics**
Fall or spring. 3 credits. Permission of instructor. R. Hebdon. An examination of the laws against employment discrimination based on race, color, religion, sex, national origin, age, and disability.

**ILRCB 798 Internship**
Fall and spring. 1-3 credits. Staff. Supervised research only for those enrolled in the ILR M.P.S. program.

**ILRCB 799 Directed Studies**
Fall and spring. Credit to be arranged. For individual research conducted under the direction of a member of the faculty.
ECONOMIC AND SOCIAL STATISTICS

A. Hadi, Chair; J. Angellotti, J. Bunge, T. DiCiccio, P. Vellman, M. Wells

ILRST 110-112 Mathematics for the Social Sciences
Fall 1995-1996. 3 credits. A. Hadi. Designed to provide a forum for the presentation of current research being undertaken by faculty members and graduate students in the Department of Collective Bargaining, Labor Law, and Labor History, and by invited guests. All M.S. and Ph.D. candidates in the department who are at work on their theses are strongly urged to enroll. Each student in the course will be expected to make at least one presentation during the year, focusing on the formulation, design, execution, and results of that student's thesis research.

ILRST 110 Algebra
1 credit. Four weeks. Topics include: a review of basic algebra concepts, summation and products, linear equations; quadratic, exponential, logarithmic, and other nonlinear functions; graphs, inequalities.

ILRST 111 Differential Calculus
1 credit. Five weeks. Prerequisite: ILRST 110 or passing a qualifying exam in algebra. Topics include: limits, derivatives, optimization and other applications of differentiation.

ILRST 112 Matrix Algebra
1 credit. Five weeks. Prerequisite: ILRST 110 or passing a qualifying exam in algebra. Topics include: definitions and special types of matrices, matrix addition and subtraction, matrix product, linear dependence and independence, vector geometry, matrix reduction (trace, determinant, norms), matrix inversion, linear transformation, some applications of matrices.

ILRST 210 Statistical Reasoning I
Fall and spring 1995, 1996, 1997. 4 credits. Prerequisite: ILRST 980 or permission of instructor. An introduction to the basic concepts of statistics and data analysis. Descriptive methods, mathematical models and inference procedures for univariate and bivariate data. Basic statistical designs, an introduction to probability and applications of the Binomial and Normal distributions. Estimation, confidence intervals, and tests of significance for a population mean and proportion, simple linear regression, correlation, and two-way contingency tables. Students are instructed on the use of a statistics computer package at the beginning of the term and use it for weekly assignments.

ILRST 211 Statistical Reasoning II
Fall and spring 1995, 1996, 1997. 3 credits. Prerequisite: ILRST 210 or suitable introductory statistics course. T. DiCiccio. A second course in statistics. Applications of statistical data analysis techniques, particularly to the social sciences. Topics include statistical inference; simple linear regression; multiple linear regression; elements of time-series analysis; and sample-survey design. Computer packages are used throughout the course.

ILRST 310 Statistical Sampling
Fall 1996. 3 credits. Prerequisite: two terms of statistics. Not offered 1995-96. Theory and application of statistical sampling, especially in regard to sample design, cost, estimation of population quantities, and error estimation. Assessment of nonrandom errors. Discussion of applications to social and biological sciences and to business problems. Course includes an applied project.

ILRST 311 Practical Matrix Algebra
Fall 1996. 3 credits. Not offered 1995-96. Matrix algebra is a necessary tool for statistics courses such as multivariate analysis and for other “research methods” courses in various other disciplines. One goal of this course is to provide students in various fields of knowledge with a basic understanding of matrix algebra in a language they can easily understand. Topics include special types of matrices; matrix calculations; linear dependence and independence; vector geometry; matrix reduction (trace, determinant, norms); matrix inversion; linear transformation; eigenvalues; matrix decompositions; ellipsoids and distances; some applications of matrices.

ILRST 312 Applied Regression Methods
Spring 1996, 1997. 3 credits. Prerequisite: ILRST 112 or ILRST 211 or equivalent courses. A. Hadi. First, the matrix algebra necessary to analyze regression models is reviewed. Then, multiple linear regression, analysis of variance, nonlinear regression, and linear logistic regression models are covered. For these models, least squares and maximum likelihood estimation, hypothesis testing, model selection, and diagnostic procedures are considered. Illustrative examples are taken from the social sciences. Computer packages are used. Course includes an applied project.

ILRST 313 Design and Analysis of Experiments
Spring 1996. 3 credits. Prerequisite: ILRST 211 or equivalent. J. Angellotti. The statistical design and analysis of comparative experiments including completely randomized, factorialized, randomized block, Latin squares, and split-plot designs including crossover and repeated measures. Application of statistical design to research problems. Analyses to compare treatment groups including ANOVA analysis techniques, contrasts and multiple comparison procedures. Computer packages are used.

ILRST 314 Graphical Methods for Data Analysis
Fall 1997. 3 credits. Prerequisite: ILRST 211 or equivalent. Not offered 1995-96. Classical and recently developed graphical methods for analysis and display. Characteristics of effective and honest graphs with comparison of alternative methods for understanding data. Includes study of current computer programs and methods expected to be practical in the near future: graphing of univariate data, bivariate plots, multivariate data, graphical methods of data analysis; the specification, modification, and control of graphs; study of interaction between choice of display and underlying patterns.

ILRST 410 Techniques of Multivariate Analysis
Fall. 5 credits. Prerequisite: two statistics courses or permission of instructor. Not offered 1995-96. Techniques of multivariate statistical analysis discussed and illustrated by examples from various fields. We emphasize application, but theory will not be ignored. Deviation from assumptions and the rationale for choices among techniques are discussed. Students are expected to learn how to thoroughly analyze real-life data sets using computer-packaged programs. Participants should have some knowledge of matrix notation. Topics include: multivariate normal distribution; sample geometry and multivariate distances; inference about a mean vector; comparison of several multivariate means, variances, and covariances; detection of multivariate outliers; principal component analysis; factor analysis; canonical correlation analysis; discriminant analysis, and multivariate multiple regression.

ILRST 411 Statistical Analysis of Qualitative Data
Spring 1997. 3 credits. Prerequisite: two statistics courses or permission of instructor. Not offered 1995-96. An advanced undergraduate and beginning graduate course. Includes treatment of association between qualitative variates, rank-order methods, and other nonparametric statistical techniques, including those related to chi-squared.

ILRST 499 Directed Studies
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILRST 510 Statistical Methods for the Social Sciences

ILRST 511 Statistical Methods for the Social Sciences II
Fall and spring 1995, 1996, 1997. 3 credits. Prerequisite: ILRST 510 or equivalent introductory statistics course. T. DiCiccio, J. Bunge. A second course in statistics that emphasizes applications to the social sciences. Topics include: simple linear regression; multiple linear regression (theory, model building, and model diagnostics); and the analysis of variance. Computer packages are used extensively.
[ILRST 610 Seminar in Modern Data Analysis]  
Fall 1997. 3 credits. Prerequisite: two statistics courses or permission of instructor. An advanced survey of modern data analysis methods. Topics include exploratory data analysis, data representation, philosophy of data analysis, robust methods, statistical graphics, 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, and some experience using a computer.

[ILRST 611 Statistical Computing]  
Spring 1997. 3 credits. Prerequisites: linear algebra, knowledge of programming language, and statistics at least through multiple regression. Not offered 1995-96.

A survey of new aspects of statistical computing. Topic include basic numerical methods, numerical linear algebra, nonlinear statistical methods, numerical integration and approximation, smoothing and density estimation. Additional special topics may include Monte Carlo methods, statistical graphics, computing-intensive methods, parallel computation, computing environments. Designed for graduate students in the statistical sciences and related fields interested in new computing technology. Students may be asked to write programs in a programming language of their choice.

[ILRST 612 Statistical Classification Methods]  
Fall 1997. 3 credits. Prerequisite: knowledge of statistics equivalent to the level of ILRST 312 or permission of instructor. Not offered in 1995-96.

An introduction to a variety of statistical techniques that assign objects to categories on the basis of observed characteristics of the objects. Course topics include (but are not limited to) discriminant analysis and its extensions and variations; nearest neighbor methods, classification and regression trees (CART); neural networks for classification; and estimation of error of classification rules.

[ILRST 613 Bayesian and Conditional Inference]  
Fall 1997. 3 credits. Prerequisites: Graduate level courses equivalent to OR&IE 670 and OR&IE 651 or permission of instructor. Not offered 1995-96.

This course covers the following topics: loss functions and utility theory, prior information and subjective probability, coherence, basic Bayesian inference, empirical Bayesian inference, robust Bayesian inference, Bayesian computations, ancillarity, conditional properties of statistical procedures, and Barndorff-Nielsen's exact likelihood theory.

[ILRST 614 Structural Equations with Latent Variables]  

Provides a comprehensive introduction to the generation of measurement systems, commonly known as the "LSREL model." One purpose of the course is to demonstrate the generality of this model. Rather than treating path analysis, recursive and nonrecursive models, classical econometrics, and confirmatory factor analysis as distinct and unique, we will treat them as special cases of a common model.

Another goal of the course is to emphasize the application of these techniques.

[ILRST 615 Expert Systems and Probabilistic Network Models]  
Fall 1995, 1997. 3 credits. Prerequisite: OR&IE 560 or an equivalent course in probability and statistics. A. Hadi.

This is an interdisciplinary course for students in applied mathematics, computer science, statistics, and other related fields of applications such as medical, engineering, and social sciences. Topics include components of expert systems, rule-based expert systems, probabilistic models, uncertainty measures, dependency models, Bayesian and Markov networks, propagation of uncertainties, learning structure from data, and examples of applications. Students will use computer software to gain experience.

[ILRST 711 Sensitivity Analysis in Linear Regression]  
Spring 1997. 3 credits. Prerequisite: a first course in regression analysis or linear models, or permission of instructor. Not offered 1995-96.

A course on regression for students in statistical science and related fields. Attempts to narrow the gap between the theory and practical application of the linear regression model. Classical and recently developed statistical procedures are discussed. Students will be expected to read articles and thoroughly analyze real-life data sets using computer-packaged programs. Topics include role of variables in a regression equation, regression diagnostics (outliers, leverage points, influential observations, generalized linear models, errors in variables, and multicollinearity).

[ILRST 712 Theory of Sampling]  
Spring 1996. 3 credits. Prerequisite: calculus and at least one semester of mathematical statistics. J. Bunge.

Sampling theory from the viewpoint of mathematical statistics. The first part of the course focuses on the classical or "design" approach; the second part on the more recent "model-based" approach. Attention is paid to recent progress in the field.

[ILRST 713 Counting Processes with Statistical Applications]  
Spring 1996. 3 credits. Prerequisite: a course at the technical level of Math 572 and 574 or permission of instructor. M. Wells.

The statistical analysis of life history data is playing an increasing role in the social, natural, and physical sciences. We will formulate and solve various practical problems in the statistical analysis of life history data using the modern theory of stochastic processes. We will examine the martingale dynamics for point processes relevant to life history data. Both parametric and nonparametric inference for multiplicative intensity models will be considered. The large sample properties of the proposed procedures will be discussed in detail using recent extensions of functional central limit theorems for martingales.

[ILRST 714 Topics in Modern Statistical Distribution Theory]  
Fall 1997. 3 credits. Prerequisite: Courses equivalent to Math 571, and STATS 409 or OR&IE 670. Not offered in 1995-96.

Recent research has revealed vast territories of distribution theory that are unfamiliar to most statisticians. Provides an introduction to three topics underlying this "modern" theory: infinite divisibility, decomposability, and stability; characterization of distributions; extensions of univariate distributions to multivariate distributions.

[ILRST 715 Likelihood Inference]  
Spring 1997. 3 credits. Prerequisite: graduate courses equivalent to OR&IE 670 and OR&IE 670. Not offered in 1995-96.

In most statistical models, exact distribution theory for testing hypotheses or constructing confidence intervals is either unavailable or computationally cumbersome. Inferences are routinely performed by using large-sample approximations to the distributions of test statistics. This course provides a survey of some recent higher-order asymptotic approximations for likelihood-based methods of inference.

[ILRST 716 Statistical Consulting]  

A course in practical consulting on "real-world" statistical problems. Under the supervision of the instructor(s), students will hear problems presented by clients (usually faculty and graduate students from other fields) and will collaborate in proposing a statistical model, analyzing data, and interpreting results. Statistical computing will be used as needed.

[ILRST 799 Directed Studies]  
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

INTERNATIONAL AND COMPARATIVE LABOR RELATIONS


ILRIC 332 Labor in Developing Economies  
Spring 1996. 3 credits. Prerequisite: ILR240, Economics 311, or permission of instructor. G. Fields.

The economic problems of labor in less-developed nations. Among the subjects included are determinants of income and wage structures in less-developed countries; labor demand and unemployment; labor supply and migration; human resource policy; and development strategy and employment growth.

[ILRIC 333 Western Europe, the United States, and Japan in a Changing World Economy]  
Fall. 3 credits (1 additional credit may be arranged). Open to juniors and seniors. Not offered fall 1996. L. Turner.

Offers an introduction to the contrasting national trajectories of labor in the economic and social systems of Germany, Britain, France, Japan and the U.S. Emphasis will be on (a) cross-national differences and comparisons; and (b) the different capacities that contrasting institutions offer as social and economic policies with intensifying trade competition, domestic political conflict, and the need for production reorganization and "new industrial relations."
The course will examine contemporary industrial relations reform efforts in the U.S., including innovative organizing strategies; new calls for union militance; business strategies for a "union-free" environment; efforts at labor-management cooperation; and the report of the Dunlop Commission.

ILRIC 639 The Political Economy of Mexico
Fall. 3 credits. M. Cook.
Explores the range of challenges affecting contemporary Mexican politics, society, and economic development—from democratization to highly-repressive regimes. The course provides both an introduction to Mexican political economy for those with no prior background and an opportunity for students with more knowledge of Mexico to explore a research topic in greater depth.

ILRIC 499 Directed Studies
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILRIC 532 Labor in Developing Economies
Spring. 3 credits. For graduate students. G. Fields. Students in this course attend the lectures in ILRIC 332 (see description for ILRIC 332). If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in ILRIC 332 and additional topics.

ILRIC 533 Western Europe, the United States, and Japan in a Changing World Economy
Fall. 4 credits. Graduate students. Not offered Fall 1996. L. Turner. See description for ILRIC 333. Graduate students attend class, take the midterm and submit an analytical research paper at the end of the semester.

ILRIC 537 Special Topics: Fall or spring. 3 or 4 credits. Not offered 1995-96. Staff. Devoted to new topics in the field. The specific content and emphasis vary depending upon the interests of the faculty member teaching the course.

ILRIC 631 Comparative Labor Movements in Latin America (also Government 631)
Spring. 3 credits. M. Cook. Examines the historical development of labor movements in Latin America, their role in national political and economic development, and the impact of economic liberalization, authoritarianism, and democratization on contemporary labor organizations in the region. Countries examined will include but are not limited to Mexico, Brazil, Argentina, Chile, Peru, and Venezuela.

ILRIC 632 Reforming Industrial Relations: A Comparative Perspective
Spring. 4 credits. Graduate seminar open to seniors with permission of instructor only. Not offered spring 1997. L. Turner. Will examine contemporary efforts in advanced industrial democracies to reform industrial relations. The first half of the course will cover Britain—the Thatcher reforms of the 1980s and the current labor-backed works council movement; France—the Auckland Laws of the 1980s and their effects; and Germany—the transformation of industrial relations in Eastern Germany since 1989. The second half of the course will examine contemporary industrial relations reform efforts in the U.S., including innovative organizing strategies; new calls for union militance; business strategies for a "union-free" environment; efforts at labor-management cooperation; and the report of the Dunlop Commission.

ILRIC 633 Labor, Industry, and Politics in Germany
Fall. 4 credits. Open to seniors with permission and graduate students. Not offered fall 1996. L. Turner. Is the successful postwar "social partnership" model of organized capitalism in the Federal Republic of Germany viable in the 1990s? To answer this question, we will study the works councils and co-determination, the rise of a strong postwar labor movement, the contemporary German version of social partnership, with an emphasis on current events and the new challenges for German industry and labor posed by German unification and the single European market.

ILRIC 636 Comparative History of Women and Work (also Women's Studies 636)
Fall. 4 credits. Permission of instructor. Not offered fall 1996. I. Devault. Will explore the similarities and differences between different cultures' assumptions about the work of women as well as women's experiences in varying work circumstances throughout history. Beginning with theoretical pieces and overviews of the history of women and work, most of the course will consist of in-depth examinations of specific labor situations or occupations across time and geography. Comparative examples will be taken from the United States, Europe, and the Third World.

ILRIC 637 Labor Relations in Asia
Spring. 3 credits. Permission of instructor required. Seminar format. S. Kuruvilla. For description, see the section, International Relations, Political Science.

ILRIC 638 Labor, Free Trade, and Economic Integration in the Americas (also Government 630)
Fall. 3 credits. Limited. Open to seniors and graduate students; juniors by permission. Not offered fall 1995. M. Cook. Analyzes the contemporary movements toward free trade and regional economic integration in the Western Hemisphere. Special attention is paid to labor's role in this process. Examines the origins and implications of the North American Free Trade Agreement (NAFTA), and looks at integration schemes in South America (Andean Pact and Mercosur), Central America, the Caribbean, and at hemisphere-wide initiatives. A research paper is required.

ILRIC 730 Research Seminar on Labor Markets and Economic Development
Fall or spring. 3 credits. Prerequisite: Open to M.S. and Ph.D. students only. Staff. Research seminar for students writing theses or dissertations on aspects of labor markets and economic development. Will address research questions, methodologies, and contributions in the areas of employment and unemployment, income and earnings, educational and human resource development, welfare economics, and economic growth. Numerous presentations and written papers will be required.

ILRIC 790 ILR M.P.S. Program
Fall and spring. 1–9 credits. Supervised research only for those enrolled in the ILR M.P.S. program.

ILRIC 799 Directed Studies
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILRHR 469 Immigration and the American Labor Force
Fall. V. Briggs. For description, see the section, Human Resource Studies.

ILRHR 656 International Human Resource Management
Fall or spring. V. Pucik. For description, see the section, Human Resource Studies.

ILRHR 690 Comparative Human Resource Policies and Institutions
Fall or spring. V. Pucik. For description, see the section, Human Resource Studies.

ILRHR 698 International Human Resource Policies and Institutions
Fall. J. Bishop. For description, see the section, Human Resource Studies.

ILRHR 699 Contemporary European Labor Markets
Spring. J. Bishop. For description, see the section, Human Resource Studies.

ILRL 448 Topics in Twentieth-Century Economic History: The Economics of Depression and the Rise of the Managed Economy
Fall. G. Boyer. For description, see the section, Labor Economics.

ILRL 640 Economic History of British Labor 1750–1940
Fall or spring. G. Boyer. For description, see the section, Labor Economics.

ILROB 628 Cross-Cultural Studies in Organizational Behavior
Spring. L. Gruenfeld. For description, see the section, Organizational Behavior.
LABOR ECONOMICS
J. Abowd, chair; F. Blau, G. Boyer,
R. Ehrenberg, G. Fields, R. Hutchens,
G. Jakobson, L. Kahn, R. Smith

ILRLE 140 Development of Economic Institutions
Fall. 3 credits. Prerequisite for non-ILR students: permission of instructor.
Provides students with an understanding of the historical roots of the economic system currently dominant in Western Europe and the United States. The course will focus on (a) the process of European economic growth prior to 1914, (b) the effect of industrialization on labor in Great Britain, and (c) the historical evolution of economic thought from Adam Smith to J. M. Keynes.

ILRLE 240 Economics of Wages and Employment (also Economics 341)
Fall and spring. 3 credits. Prerequisites: Economics 101-102 or Economics 103.
Applies the theory and elementary tools of economics to the characteristics and problems of the labor market. Considers both the demand (employer) and supply (employee) sides of the market to gain a deeper understanding of the effects of various government programs and decisions targeted at the labor market. Topics covered include employment demand, basic compensation determination, education and training, benefits and the structure of compensation, labor-force participation and its relation to household production, occupational choice, migration, labor-market discrimination, and the effects of unions.

ILRLE 340 Economic Security
Fall or spring. 3 credits. Prerequisites: ILRLE 240 or equivalent.
Considers the economic and social effects of income security measures. Analyzes programs offering protection against economic loss due to industrial injury and permanent disability, illness, old age, premature death, and unemployment, as well as private efforts to provide security, and the problems of integrating public and private programs. Also considered are modifying economic security measures are also considered.

ILRLE 345 Corporate Finance
Spring. 4 credits. Includes a mandatory computer lab. Prerequisites: Economics 101, 102, 103 or equivalent. Not offered 1995-96.
Covers the basic material in capital budgeting and security pricing at the level of a first-year MBA course. Topics include (1) net present value; (2) the valuation of corporate balance sheets (assets and liabilities); (3) risk, return, and security pricing; (4) capital structure and the cost of capital; and (5) special financial management techniques for human resource managers. The specialized tools include application of net present value to compensation and benefit costs; measuring the effects of tax systems on employment costs; pension systems; mergers, acquisitions and regulation of the financial sector; and the human resource balance sheet.

ILRLE 348 The Economics of Unemployment
Fall. 4 credits. Prerequisite: ILRLE 240/540 or permission of instructor. Not offered 1995-96.
This course introduces students to several issues fundamental to an understanding of unemployment: the social costs; definitional questions and measurement problems; the patterns of unemployment; and the various types of unemployment, their causes, and the policies that can or have been pursued to alleviate unemployment. The course is designed for undergraduate and graduate students who have taken a survey course in labor economics or its equivalent.

ILRLE 440 The Economics of Health Care
Spring. 4 credits. Prerequisite: ILRLE 240 or equivalent.
Overview of the basic economic models of the key actors in the U.S. health care system. We will then consider the entire system of the U.S. system in its goals, including ensuring equitable access to medical care, controlling health care expenditures, and providing long-term care for the chronically ill.

ILRLE 441 Income Distribution
Fall. 4 credits. Prerequisite: ILRLE 240 or equivalent.
Explores income distribution in the United States and the world. Topics to be covered include functional and size distributions of income, wage structure, income-generating functions and theories, discrimination, poverty, public policy and income distribution, and changing income distribution and growth.

ILRLE 442 The Economics of Employee Benefits
Fall. 4 credits. Prerequisites ILRLE 240 or equivalent.
An in-depth treatment of the economics and financial management and administration of all employee benefits: health care, insurance, retirement income, family-care benefits, executive incentive plans, and other compensations provided as a service or contingent financial package to employees. Detailed international comparisons of health care and retirement systems are included.

ILRLE 445 Women in the Economy
Fall. 4 credits. Prerequisite ILRLE 240 or equivalent.
Examines the changing economic roles of women and men in the labor market and in the family. Topics include: a historical overview of changing gender roles; the determinants of the gender division of labor in the family; trends in female and male labor force participation; gender differences in occupations and earnings; and the consequences of women's employment for the family.

ILRLE 448 Topics in Twentieth Century Economic History: The Economics of Depression and the Rise of the Managed Economy
Fall. 4 credits. Prerequisites: ILRLE 240 or Economics 314.
Topics covered include: the causes of the Great Depression in the United States; the economics of the New Deal; the causes of high unemployment in interwar Great Britain; the rise of Keynesian economics and the development of demand management policies in Great Britain and the United States after 1945.

ILRLE 495 Honors Program
Fall and spring (yearlong course). 3 credits each term.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 497-498 Internship
Fall and spring. 3, 4, 6 credits. Not offered 1995-96.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 499 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRLE 540 Labor Economics
Fall. 3 credits. Prerequisites: Economics 101-102 or Economics 103 or equivalent.
Required of graduate students majoring in labor economics and M.I.L.R. candidates. Applies the theory and elementary tools of economics to the characteristics and problems of the labor market. The course considers both the demand (employer) and supply (employee) sides of the market to gain a deeper understanding of the effects of various government programs and decisions targeted at the labor market. Topics covered include employment demand, basic compensation determination, education and training, benefits and the structure of compensation, labor-force participation and its relation to household production, occupational choice, migration, labor-market discrimination and the effects of unions.

ILRLE 541 Social Security and Protective Labor Legislation
Spring. 3 credits. Prerequisite: ILRLE 540 or equivalent. Required of graduate students majoring in labor economics and M.I.L.R. candidates.
Considers the economic and social effects of income security measures. Analyzes programs offering protection against economic loss due to industrial accident, temporary and permanent disability, illness, old age, premature death, and unemployment, as well as private efforts to provide security, and the problems of integrating public and private programs. Proposals for amending or modifying economic security measures are also considered.

ILRLE 640 Economic History of British Labor 1750-1940
Fall or spring. 4 credits. Not offered 1995-96.
Will examine various aspects of British labor history from the beginning of the Industrial Revolution until World War II. Specific topics will include: (1) monetary and non-monetary changes in workers' living standards; (2) internal migration and emigration; (3) the London labor market; (4) the extent of poverty and the evolution of the welfare state; (5) Luddism and Chartism; and (6) the development of trade unions.

ILRLE 642 Economic Analysis of the Welfare State
Spring. 4 credits. Includes economic rationales for government intervention and analysis of the effects of programs on economic welfare. Discusses taxes, in-kind, and cash programs. Includes some discussion of welfare states in other countries.

ILRLE 643 Special Topics in Labor Economics
Fall or spring. 3 or 4 credits. Not offered 1995-96.
Topics vary with the offering. Devoted to new policy issues and to recent developments in labor economics.
additional course requirements. If enrollment warrants, they will also meet separately at a time to be arranged for discussion of topics in 442 and additional topics.

**ILRLE 743 Empirical Modeling**

Spring. 4 credits.

Covers the implementation of nonclassical models of the demand for commodities (including leisure) by households and the demand for factors of productions by firms. It will cover the use of both the primal and dual formulations of the problem to develop empirically testable models of demands by both firms and households. It will then cover the estimation of these demand systems and testing of the theoretical restrictions. The conventional demand systems (including LES, AIDS, etc.) will be analyzed. Attention will be paid to both exact functional forms as well as approximating functions. Additional topics include non/semi-parametric estimation of derivatives, rationing models, and differences between long- and short-run factor demands. Other topics depending on time and student interest.

**ILRLE 744 Seminar in Labor Economics I** (also Economics 641)

Fall. 3 credits. ILRLE 744, 745 and 746 constitute the Ph.D.-level sequence in labor economics.

Reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas.

**ILRLE 745 Seminar in Labor Economics II** (also Economics 642)

Spring. 3 credits. ILRLE 744, 745 and 746 constitute the Ph.D.-level sequence in labor economics.

Reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas.

**ILRLE 746 Seminar in Labor Economics III** (also Economics 643)

Spring. 4 credits. ILRLE 744, 745 and 746 constitute the Ph.D.-level sequence in labor economics.

Reading and discussion of selected topics in labor economics. Applications of economic theory and econometrics to the labor market and human resource areas.

**ILRLE 748 Models for Limited Dependent Variables**

Fall. 4 credits.

Covers statistical methods for models in which the dependent variable is not continuous. It covers models for dichotomous response (including probit and logit) and polychotomous response (including ordered response and multinomial logit), various types of censoring and truncation (e.g., the response variable is only observed when it is greater than a threshold), as well as sample selection issues, etc. Will also include an introduction to duration analysis. Covers not only the statistical issues but also the links between behavioral theories in the social sciences and the specification of the statistical model.

**ILRLE 749 Economics of Development** (also Economics 672)

Fall. 4 credits. Prerequisites: First-year graduate economic theory and econometrics.

Analytical approaches to the economic problems of developing nations. Topics to be covered include: some old and new directions in development economics thinking, the welfare economics of poverty and inequality, empirical evidence on who benefits from economic development, labor market models, project analysis with application to the economics of education, and development policy.

**ILRLE 790 ILR M.P.S. Program**

Fall and spring. 1-9 credits. Supervised research only for those enrolled in the ILR M.P.S. program.

**ILRLE 798 Internship**

For description, see the section on Collective Bargaining, Labor Law, and Labor History.

**ILRLE 799 Directed Studies**

For description, see the section on Collective Bargaining, Labor Law, and Labor History.

**ILRLE 940 Workshop in Labor Economics**

Fall and spring. 3 credits. Intended for Ph.D. students who have started to write their dissertations. Presentations of completed papers and work in progress by faculty members, advanced graduate students, and speakers from other universities. Focus is on the formulation, design, and execution of dissertations.

**ORGANIZATIONAL BEHAVIOR**

E. Lawler, chair; S. Bacharach, L. Gruenfeld, J. Halpern, T. Hammer, W. Sonnenstuhl, R. Stern, P. Tolbert, L. Williams

**ILRLE 170 (121) Introduction to Micro Organizational Behavior and Analysis: The Social Psychology of the Workplace**

Fall. 3 credits. Staff

This introductory (survey) course considers the basic individual and group processes in the workplace. At the individual level, we will study personality, motivation, perception, attitude formation, and decision making. On the group level, we will emphasize group dynamics, leadership, power and influence, and culture.

**ILRLE 171 (120) Introduction to Macro Organizational Behavior and Analysis**

Spring. 3 credits. Staff

The relationship between industry and the economy as a whole and its implications for other social institutions in American society (including stratification, politics, and American values) is discussed. The course moves from classical sociological theory to the analysis of complex organizations. The study of industrial organizations and of complex organizations in general, emphasizing authority relations, goals, the division of labor, bureaucracy, and organizational design.

**ILRLE 320 The Psychology of Industrial Engineering**

Fall. 4 credits. T. Hammer.

A study of the human factors in the industrial engineering of work, workplaces, tools, and machinery. The course examines the aspects of individual and social psychology that operate in the work setting and that should be taken into account in the design of jobs. These include limitations of the human sensory system, individual differences in skills, abilities, motives, and needs; group dynamics; intrinsic motivation; job satisfaction; conflict.
ILROB 325 Organizations and Social Inequality
Spring. 3 credits. Limited. P. Tolbert.
Examines the central role that organizations in industrial societies play in allocating income, status, and other resources to individuals. A variety of theoretical explanations of social inequality will be examined, and the social policy implications of each will be considered. Class assignments are designed to develop students' general writing skills, as well as substantive understanding of different theories and approaches to the problem of inequality.

ILROB 328 Cooperation, Competition, and Conflict Resolution
Spring. 4 credits. Prerequisite: one course in social psychology or equivalent. Staff.
An examination of theory and empirical evidence relating to the resolution of interpersonal, intergroup, and international conflict. Specific attention is devoted to studying factors that contribute to the development of cooperative or competitive bonds between parties to a conflict. The following topics are studied: the availability and use of threat; the credibility, intensity, and costs of threat; fractioning and escalating conflict. Personality and situational factors that regulate conflict intensification are stressed.

ILROB 392 Organizational Cultures
Fall or spring. 3 credits. Prerequisite: one or more courses in sociology. Staff.
Reviews the concept of culture as it has evolved in sociology and anthropology, applying it to formal organizations in workplaces such as corporations and unions. The course first examines the nature of ideologies as sense-making definitions of behavior, concentrating on the cultural forms that carry these cultural messages, rituals, symbols, myths, sagas, legends, and organizational stories. Considerable attention will be given to rites and ceremonies as a cultural form in organizational life that consolidates many of these forms into one. The course will examine types of ceremonial behavior such as rites of passage, rites of enhancement, and rites of degradation, including the role of language gestures, physical sets in ceremonial behavior. The presence of subcultures and countercultures in organizational behavior will also receive attention, especially the part played by occupational subcultures in formal organizations.

ILROB 397 Individual Differences and Organizational Behavior
Fall or summer. 4 credits. Recommended: some acquaintance with the substance and methods of behavioral or social science. L. Gruenfeld.
Examines personality from a comparative psychodynamic point of view. Social behavior, authority relationships, and work motivation are used to illustrate how various theories could be applied to understand behavior and experience in organizations.

ILROB 373 Organizational Behavior Simulations
Fall. 3 credits. Prerequisites: ILROB 170 and 171 or equivalent. Limited enrollment. R. Stern.
Basic principles of organizational behavior as studied through readings and participation in four simulation games. Simulations model traditional organizations and cooperatives. One game models executive decision making and another assembly work organization. Organizational structure, decision making, conflict, cooperation, and power are the central topics of discussion. The contrasting bases of power in the organizations permits the study of the assumptions underlying organizational structure and process.

ILROB 421 Regulating the Corporation
Fall. 4 credits. R. Stern.
Will examine public and private power from an organizational perspective. The resource-dependence approach to organization-environment relations provides a framework for interpreting government attempts at the regulation of corporate behavior. Topics cover the structure and functioning of government regulatory agencies and corporate responses to regulation, including corporate strategy, change, and political influence. Business ethics and corporate social responsibility are considered along with the role of interest groups such as consumer or citizens organizations. Research and case materials focus on the implementation of environmental protection, workplace health and safety, equal opportunity, antitrust, securities, and consumer regulations.

ILROB 422 Organizations and Deviance
Fall. 3 credits. W. Sonnestuhl.
Focuses upon the deviant actions of organizations, including such behaviors as price fixing, environmental pollution, illegal campaign contributions, and discrimination in hiring and promotion. Examines the origins of such behaviors within organizations, the processes by which they become institutionalized, and the processes by which they become defined as deviant organizational actions. Within this context, the course will examine such contemporary cases as Exxon's Valdez oil spill, Iran-Contra, drug testing, and the federal savings and loan scandal. These events raise troubling questions about what it means to live and work within an organizational society, and they cannot be dismissed as instances of a few individuals gone bad.

ILROB 423 Negotiations
3 credits. Limited enrollment. J. Halpern.
Frequent in-class exercises teach the basic concepts of negotiation, negotiation in personal and business contexts. We will emphasize how individual-level biases and self-presentation may either facilitate or hinder negotiations. Participation in all exercises in this class is mandatory. Other requirements include written preparation for exercises, journal entries analyzing the exercises, and a final paper.

ILROB 425 Sociology of Industrial Conflict
Spring. 4 credits. R. Stern.
The focus is on the social, economic, and political causes of industrial conflict. These causes include socialization, class relations, work-non-work effects, as well as the nature of work and employment relations. Social movement, collective organization, and individual actions are examined including such manifestations of conflict, as strikes, labor turnover, absenteeism, and sabotage, and the influence of the environments in which they occur.

ILROB 427 The Professions: Organization and Control
Fall. 3 credits. Prerequisite: Permission of the instructor. P. Tolbert.
Focus is on the sources of power and control exercised by professional groups in contemporary society. A number of issues will be examined in this context including the role of professions in society, processes through which an occupational group becomes defined as a profession, sources of control that professional associations have over their members, relations between professionals and nonprofessionals in organizations, and the relationship between unionization and professionalization of occupations.

ILROB 428 Organizational Change and Intervention
Fall. 3 credits. Limited to 25. Juniors and seniors with permission of instructor. J. Williams.
Seminar will focus on planned and unplanned change in organizations. Topics will include mergers and acquisitions, team building, self management and the role of change agents. Participants will be required to develop and present topics in addition to keeping a weekly journal and participating in exercises.

ILROB 429 Organizational Politics and Institutional Change
Spring. 2 credits. 7 weeks. Limited to juniors and seniors with permission of the instructor. Please see instructor before the first class. S. Bacharach.
Will examine the market, cultural, political, and structural forces that change the organizational "rules of the game," how those changes affect individuals and organizations, and the distortions that occur as individuals and organizations attempt to adjust to a new unstable order. Issues to be examined include power, corruption, dealmaking, rationality, uncertainty, and competition. Course requirements include completing a major research paper and leading a class discussion.

ILROB 470 Group Processes
Fall. 3 credits. Prerequisites: ILROB 170 and 171 or equivalent. Permission of instructor. E. Lawler.
A review of theoretical approaches and selected research on group phenomena, including the formation of groups, the structure of group relations, and group performance. Specific topics include conformity and obedience, status and power relations, tactics of influence, solidarity and commitment, the management of emotion, the emergence and change of microcultures, and the role of groups in networks and organizations.
ILROB 471 Organizational Analysis of Trade Unions
Spring. 4 credits. Prerequisites: ILROB 170 and 171 and one additional course in organizational behavior. Staff. 

ILROB 472 Applied Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 170 and 171. S. Bacharach.

ILROB 473 Mediation
Fall and spring. 3 credits. Limited enrollment with permission of instructor. J. Halpern.

ILROB 477 Technical Workers and the Social Organization of Research and Development
Spring. 3 credits. Prerequisite: ILROB 170, 171 or an introductory course in sociology or anthropology. Staff.

ILROB 495 Honors Program
Fall and spring (yearlong course). 3 credits each term. For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILROB 497-498 Internship
Fall and spring. 3 and 6 credits. For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILROB 499 Directed Studies
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILROB 520 Micro Organizational Behavior and Anarch
Fall or spring. 3 credits. Staff. Survey of concepts, theories, and research from the fields of organizational and social psychology as these relate to the behavior of individuals and groups in organizations. Job attitudes, motivation, performance, leadership and power, group formation, perception, and organizational climate. A preliminary course for advanced work in organizational behavior.

ILROB 521 Macro Organizational Behavior and Analysis
Spring. 3 credits. Staff. Formal organizations are studied from the perspectives of classical organization theory, human relations theory, and comparative and cross-cultural analysis. Contemporary theories and quantitative approaches to organizational structure are also considered in some detail. Intended to be preliminary to more intensive work in organizational behavior.

ILROB 560 Theories of Organizational Change, Innovation, and Evaluation
Spring. 4 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology. W. Sonnenstuhl.

ILROB 620 Theories of Organizational Change, Innovation, and Evaluation
Spring. 4 credits. Prerequisites: two organizational behavior courses at the 300 level, or advanced courses in sociology or psychology. W. Sonnenstuhl.

ILROB 621 Macro Organizational Behavior and Analysis
Spring. 3 credits. Staff. Formal organizations are studied from the perspectives of classical organization theory, human relations theory, and comparative and cross-cultural analysis. Contemporary theories and quantitative approaches to organizational structure are also considered in some detail. Intended to be preliminary to more intensive work in organizational behavior.

ILROB 622 Advanced Topics in the Social Psychology of the Workplace
Spring. 3 credits. Permission of instructor. J. Halpern.

ILROB 623 Micropolitics in Organizations
Spring. 3 credits. Prerequisites: ILROB 170 and 171. Limited, permission of instructor. S. Bacharach.

ILROB 624 Groups in Work Organizations
Fall. 4 credits. Enrollment limited. Permission of instructor required. L. Gruenfeld.

ILROB 625 Conflict, Power and Negotiation
Fall. 3 credits. Open to seniors and graduate students. Permission of instructor is required. Limited enrollment. E. Lawler. Theoretical seminar adopts a power perspective on bargaining and collective bargaining. Examines how power relations and power processes affect the tactics people adopt in bargaining and also when power relations inhibit or promote conflict resolution. "Power" is viewed as a capability, embedded in a social structure, and tactics are the action based on or using such power. The seminar gives overview of several theoretical approaches to conflict and bargaining (e.g., rational choice, cognitive, social exchange) and places the power perspective in this context.

ILROB 626 Advanced Topics in the Social Psychology of the Workplace
Spring. 3 credits. Permission of instructor. J. Halpern.

IlroB 521 Organizational Diagnosis Intervention and Development
Spring. 4 credits. Prerequisites: undergraduates, ILROB 170 and 171; graduate students, ILROB 520 and 521 or equivalent, and permission of instructor. L. Gruenfeld.

This applied course considers theories and techniques for the identification and improvement of organizational problems at the behavioral (micro) level. Methods for the implementing of change are evaluated in the light of several normative and descriptive theories of individual and group development and effectiveness. The course emphasizes both quantitative and qualitative data processing procedures.

IlroB 622 Advanced Topics in the Social Psychology of the Workplace
Spring. 3 credits. Permission of instructor. J. Halpern.

IlroB 623 Micropolitics in Organizations
Spring. 3 credits. Prerequisites: ILROB 170 and 171. Limited, permission of instructor. S. Bacharach.

Examines micro-political processes in organizations. Neo-Marxian, neoclassical, and Weberian approaches to organizational politics will be specifically analyzed. An attempt will be made to understand how the micro-political rules of organizational games are institutionalized. Among the ideas to be discussed are the institutionalization of ideology and specification of the relationships among power, tactics, and strategy. Interest groups and coalition politics will be examined in terms of conflict and bargaining. Other issues to be discussed include corruption, dealmaking, and competition. Examples will be drawn from both the private and public sectors. Seminar requirement will include an in-class presentation and a major paper and/or take-home final exam.

IlroB 624 Groups in Work Organizations
Fall. 4 credits. Enrollment limited. Permission of instructor required. L. Gruenfeld.

This is an experiential learning course designed primarily for advanced students who have a comprehensive background in the theory and methods of the behavioral sciences. Work group members study their roles and relationships to each other, the task, other work groups, and especially authorities. Students write a number of self-reflective papers in which they conceptualize their experiences and relate them to theory and method in organizational behavior and experience.

IlroB 625 Conflict, Power and Negotiation
Fall. 3 credits. Open to seniors and graduate students. Permission of instructor is required. Limited enrollment. E. Lawler. Theoretical seminar adopts a power perspective on bargaining and collective bargaining. Examines how power relations and power processes affect the tactics people adopt in bargaining and also when power relations inhibit or promote conflict resolution. "Power" is viewed as a capability, embedded in a social structure, and tactics are the action based on or using such power. The seminar gives overview of several theoretical approaches to conflict and bargaining (e.g., rational choice, cognitive, social exchange) and places the power perspective in this context.
ILROB 627 Leadership in Organizations  
Spring. 3 credits. Prerequisites: two organizational behavior courses at the 300 level or advanced courses in sociology or psychology. L. Gruenfeld. An examination of theories and research findings from the behavioral sciences that are relevant to leadership and the influence process in groups and organizations. Personality, situational factors, intergroup processes, interpersonal perception as well as motivation to lead and to follow will be discussed. The implications for leadership training, organization development, and action research are explored.

ILROB 628 Cross-Cultural Studies in Organizational Behavior  
Spring. 3 credits. Permission of instructor before registering in course. L. Gruenfeld. Designed for students interested in social psychological theory and research in internationalizations of behavior and experience in organizations. Variables such as power distance, individualism-collectivism, universalism-particularism and attitudes toward authority as well as work motivation will be examined. Upon completion of the readings and discussion of conceptual materials and consideration of several major international comparison studies, each student will prepare and present a paper on a topic of his/her own choice usually related to his/her country of origin (China, Japan, German, USA, etc.).

ILROB 629 Personality in Organization  
Fall. 4 credits. Open to undergraduates with permission of instructor. L. Gruenfeld. This advanced course considers psychodynamic theories of organizational diagnosis at the individual and group levels. Topics include leadership, power, authority, work motivation, intervention, and change. The topics are discussed and applied in small study groups. The role of the consultant as a resource person. Class members study and research their own behavior and present their qualitative and quantitative findings to the class. Students are expected to have background and interest in both research methods and theory.

ILROB 670 Semester in Manufacturing  
Spring. 15 credits. Open to master's and Ph.D. students in Industrial and Labor Relations with permission of instructor. Intended for students who want to work as professionals or who have a strong interest in the manufacturing industries. It is taught by an interdisciplinary faculty team from the College of Engineering, the Johnson School of Management, and the School of Industrial and Labor Relations. Course material will be based on plant visits and project work with local industry. Student participation will be in interdisciplinary teams with members representing the three colleges. Course content will concentrate on four major issues thought to make a competitive difference in today's economic environment: (1) the changing environment for product design; (2) rapid-response production systems; (3) organizational and inter-organizational and compensation of the manufacturing team; and (4) performance measurement.

ILROB 671 Organizations as Social Networks  
Spring. 3 credits. Prerequisites: one or more courses in organizational behavior, sociology, psychology, anthropology, or political science. Examination of just what research methods might be helpful in understanding the complex social structures of organizations. The course will be divided into four parts: (1) an introduction to the analysis of complex social structures; (2) an exploration of the implications of complex social structures for the study of social behavior; (3) an overview of the major methods of analysis of social structures; and (4) an examination of the limitations imposed on data analysis and interpretation by traditional measures. Examples of topics covered in the course: the use of Chi-square, t-tests, ANOVA, simple and data generated by group members. Personality, leadership culture, and group dynamics are the major focus. Students will observe, record, and videotape group and individual behavior, which will be analyzed with the help of microcomputer methods, especially SYMLOG (a system for the multiple-level observation of groups) developed by Bales (1970, 1979). In addition to lectures and discussion of research papers this course will also include a research project designed and executed by the students.

ILROB 720 Issues of Measurement in Research on Organizations (Instrumentation)  
Fall. 4 credits. Concerns the study of tests and measures used to assess central variables in organizational behavior and related fields. Students will learn where to find measures suitable for their research purposes and will examine the theories that define the constructs being measured; the empirical information available about different measures; their construction, reliability, and validity; and the ways in which the instruments have been used in research and practice.

ILROB 721 Advanced Micro Organizational Behavior  
Spring. 3 credits. Prerequisites: ILROB 520 and 521. Examines the historical development of psychological theories of organizations and contemporary issues in micro organizational research. The course will emphasize reading and analysis of primary source material.

ILROB 722 Advanced Macro Organizational Behavior  
Fall. 3 credits. Prerequisites: ILROB 520 and 521. Examines the historical development of sociological theories of organizations and contemporary issues in macro organizational research. The course will emphasize reading and analysis of primary source material.

ILROB 723 Behavioral Research Theory, Strategy, and Methods I  
Fall. 4 credits. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior, but other graduate students may enroll. Materials studied in ILROB 723 and 724 include (1) theoretical, conceptual, and ethical questions; (2) survey research and attitude-scaling procedures; (3) laboratory research methods; (4) participant observation and interview methods; (5) use of documents and qualitative data analysis. Provides students with important philosophical background for doing research and exposes them to a well-balanced, interdisciplinary part of qualitative and quantitative research tools.

ILROB 724 Behavioral Research Theory, Strategy, and Methods II  
Spring. 3 credits. Designed to meet the needs of M.S. and Ph.D. candidates majoring in organizational behavior, but other graduate students may enroll. Course will cover (a) the analysis and interpretation of quantitative data, (b) traditional problems encountered in the assessment of human and organizational characteristics, (c) the use of different methods of data analysis, and (d) an examination of the limitations imposed on data analysis and interpretation by traditional measures. Examples of topics covered in the course: the use of Chi-square, t-tests, ANOVA, simple and
multiple correlation and regression, reliability and validity analyses, causal models, factor analysis, scale construction.

ILROB 726 Analysis of Published Research in Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 520 and 521 and one year of statistics.
An advanced research methods course that critically examines published research papers in the field of organizational behavior in terms of research design and method as well as theory.

ILROB 726 Selected Topics in Organizational Behavior
Fall. 3 credits. Prerequisites: ILROB 520 and 521 and permission of instructor.
An advanced seminar that seeks to develop an interdisciplinary perspective on selected topics in organizational behavior. The topics themselves will change from year to year depending on participants’ interests. Course is designed to allow students and the instructor to jointly pursue significant scholarly inquiry into one or more areas of organizational theory. Emphasis will be placed on exploring the relevance of tradition in related disciplines (anthropology, linguistics, philosophy, sociology, etc.) that may enrich our understanding of organizational life.

ILROB 727 Work and Industrial Conflict
Spring, weeks 7–14. 2 credits.
A concentrated examination of the sociology of industrial conflict. The seminar focuses on classic formulations of conflict theory in sociology, then the social, political, economic causes of industrial conflict. Both individual and collective forms of conflict expression are examined. Emphasis will be placed on exploring the relevance of tradition in related disciplines (anthropology, linguistics, philosophy, sociology, etc.) that may enrich our understanding of organizational life.

ILROB 728 Theories of Motivation and Leadership
Spring. 2 or 4 credits. Prerequisites: ILROB 520 and 521.
Two independent but sequence-connected minicourses.
(1) Theories of Work Motivation. 7 weeks. 2 credits.
Course will provide an introduction to basic concepts of human motivation in general, with particular emphasis on the theories that explain and predict work motivation. Students will examine the empirical research that tests the validity of the theories and shows how and under what conditions different motivation models can be used in practice in work organizations.
(2) Theories of Leadership and Power. 7 weeks. 2 credits.
Several current microtheories of leadership and power and related research are examined. The disciplinary perspective employed is social organizational psychology and the level of analysis emphasized is action and experience of individuals in groups.

ILROB 729 Organizational Change and Intervention
Fall. 3 credits. Graduate students only; no exceptions.
This seminar is concerned with planned and unplanned change in organizations. It is designed to analyze theory in practice. Particular attention will be paid to the role of internal and external change agents. Class members will be encouraged to analyze contemporary changes such as mergers and acquisitions and work force reductions.

Participants will submit weekly work force journals.

ILROB 770 The Cultures of Work Organizations
Fall. 3 credits. Open only to graduate students.
Considers both administrative and occupational cultures in the workplace. It takes an anthropological perspective, focusing on ideologies as the main ingredient of cultures but emphasizing the role of cultural forms, e.g., myths, stories, sagas, language, rites and ceremonies, and physical settings of meaning. It pays special attention to the place of subcultures and countercultures in the makeup of administrative culture and to occupations as a major source of subcultures. The role of the environment in which the organizations are embedded, and its influence on workplace cultures, is also included. Forms of cultural leadership and approaches to reading and changing cultures are also considered.

ILROB 773 Advanced Seminar in Cross-Cultural Studies of Organizational Behavior
Fall. 3 credits. Permission of the instructor.
Considers theory and method for the study of cross-cultural and cognitive style variables. Members participate in the conceptualization and conduct of a comparative research project.

ILROB 774 Negotiations
Fall. 3 credits. Limited enrollment.
Frequent in-class exercises teach the basic concepts of and methods for effective negotiation in personal and business contexts. We will consider how individual-level biases and self-presentation may either facilitate or hinder negotiations. Applications of techniques discussed in class to behavior in business and law will be emphasized. Participation in all exercises in this class is mandatory. Other requirements include journal entries analyzing the exercises, a final paper, and an oral presentation.

ILROB 776 Organizational Implications of World Class Manufacturing
Fall. 3 credits.
Aimed at helping students develop an understanding of organizations as complex social systems, and of the behavioral implications of new manufacturing initiatives. Live case studies are used to study the introduction of a variety of innovations in contemporary manufacturing firms, including manufacturing cells and teams, concurrent engineering, Total Quality Management, and Just-in-Time material flow. Analyses emphasize the impact of such innovations on individuals' role definitions and relationships, organizations communication requirements and patterns, group dynamics, leadership behaviors, labor relations, and human resource management systems. ILROB 776 is a core course in the Master of Engineering/Manufacturing Option degree program.

ILROB 777 Personality in Work Groups and Organizations
Spring. 3 credits. Prerequisite: statistical methods and/or a course in research methods. Each student will administer, score, and statistically test theory-driven hypothesis. Staff. Discusses several theories of personality and related research findings. The relationship of personality to work motivation and leadership and interpersonal behavior in groups (teams) in also considered. Methods of research including observational, peer report, and self-report, as well as performance tests are studied.

ILROB 778 Solidarity in Groups
Fall 1995. 3 credits. Staff.
Examines sociological and social psychological theories about how social solidarity or a "sense of community" comes about and is maintained in groups and organizations. Distinguishes emotional, normative, and instrumental bases for social solidarity and shows how these promote or inhibit subgroup formation in organizations, commitment of individuals to organizations, and organizational citizenship behavior.

ILROB 790 ILR M.P.S. Program
Fall and spring. 1–9 credits. Supervised research only for those enrolled in the ILR M.P.S. program.

ILROB 798 Internship
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILROB 799 Directed Studies
For description, see the section, Collective Bargaining, Labor Law, and Labor History.

ILROB 920 Organizational Behavior Workshop
Fall. 2 credits. Limited to M.S. and Ph.D. candidates in the department. S/U grades only.
This workshop is designed to provide a forum for the presentation of current research undertaken by faculty members and graduate students in the Department of Organizational Behavior and by invited guests. All M.S. and Ph.D. candidates in the department who are at work on their theses are strongly urged to enroll. Each student in the course will be expected to make at least one presentation during the year, focusing on the formulation, design, execution, and results of that student's thesis research.

HUMAN RESOURCE STUDIES

ILRHR 266 Personal Computer Basics
Provides basic skills in the use of IBM personal computers (PCs) using the Windows
environment. Course covers basic hardware, terminology, fundamentals of Disk Operating System (DOS), Windows environment, Excel for Windows, Microsoft Access for Windows, and Powerpoint for Windows. Emphasis is placed on hands-on experience using examples demonstrating human resource issues and PC-based solutions. This course is a prerequisite to several advanced Human Resource Management electives.

ILRHR 360 Human Resource Economics and Public Policy
Fall 1995, spring 1996. 3 credits. Open to sophomores, juniors, and seniors. V. Briggs.
A review of labor-market trends, data collection systems, and theories pertaining to public efforts to develop the employment potential of the nation's human resources and to combat unemployment. The major segments of the nation's educational training enterprise—public education, higher education, employer-provided training, apprenticeship, and special training programs for disadvantaged—all are examined. Special policy and programmatic issues pertaining to youth, rural workers, welfare reform, direct job creation, worker relocation, economic development, tax credits, industrial policy, and "enterprise zone" proposals are examined. Comparisons are made with other industrialized nations.

ILRHR 362 Career Development: Theory and Practice
Fall 1995, spring 1996. 2 credits. 7 weeks. Prerequisite: ILRHR 260 or permission of instructor. Limited to 30. S-U only. J. McPherson.
The components of career management: individual factors and organizational realities in the development of both careers and organized programs for career management. Two complementary learning tasks required: information-gathering for career decision making based on self-assessment activities, and comprehension of occupational circumstances and practices encountered as careers develop. Grade based on short writing assignments and research paper.

ILRHR 366 Women at Work
Fall or spring. 3 or 4 credits. Prerequisite: ILRHR 260 or equivalent.
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.

ILRHR 460 Human Resource Management for Small Business
Fall 1995. 4 credits. Open to juniors and seniors. T. Welboume.
Will be taught using a series of case studies developed from small firms. After an initial introductory section exploring the human resource management issues most critical to the growth and development of small businesses, the balance of the course will focus on selected human resource management issues raised by the various case studies. Students will analyze the problems of each case and prepare a report setting forth their recommendations for resolving the human resource problems and achieving the desired business objectives. Every second week the class will meet for a two-hour session to present and discuss the student reports concerning each case. Owners and managers of the small business firms studied will be present to discuss each case with the students.

ILRHR 468 Organization and Human Resources Management Simulation
Summer 1995. 3 credits. Limited to juniors and seniors. Prerequisite: ILRHR 260 or equivalent. 3 weeks. W. Wasmuth.
Uses a simulation model and an open-systems approach as means to enhance students' skills in strategic planning and managerial decision making. Attention is given to the implications and efforts of strategic human resource managers and supervisory decisions as measured by ten organizational performance indicators, including quality of work life, employee productivity, customer satisfaction, employee retention, internal control, and the bottom line. Each student will be assigned to a group (team) of five members and must be committed to the work of that group. Each individual paper is also required. Regular attendance is required.

ILRHR 469 Immigration and the American Labor Force
Fall 1995. 3 credits. V. Briggs.
Assesses the role that immigration plays as a source of human resource development in the United States. Immigration policy will be placed in an evolutionary context but primary attention will be given to the post-1965 revival of mass immigration. In addition to legal immigration, policies pertaining to border commutors, illegal immigration, "maquiladoras," refugees, asylees, and nonimmigrant workers are also examined. Comparisons are also made with immigration systems of other nations.

ILRHR 495 Honors Program
Fall and spring (year-long course). 3 credits each term.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 497-499 Internship
Fall and spring. 3 and 6 credits.
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 499 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 560 Human Resource Management
Fall 1995 and spring 1996. 3 credits.
Open only to graduate students. Staff. A survey course covering the major areas of the management of human behavior in work organizations. Consideration is given to such aspects of strategic and human resource planning, design and management of work teams, staffing, training and management development, organization development, compensation, and employee and labor relations. Emphasis is on the application of theory and research to solution of practical problems.

ILRHR 656 International Human Resource Management
Spring 1996. 3 credits. Prerequisite: ILRHR 260/560.
This course focuses on international human resource strategies in multinational firms. It has two major objectives: to enhance the understanding of key functional and strategic issues related to HRM activities in international firms, and to develop practical applications of concepts learned from the course in leading U.S. corporations. In the first part of the course, the emphasis is on the theory of international HRM; the second part is focused on field problems. During the semester, students will conduct TEAM research on state-of-the-art HRM practices in leading U.S. multinationals. In addition, each student will prepare a review paper on one specific area of HRM of his or her choice.

ILRHR 657 Employer Training: Economic and International Perspectives
3 credits.
Examines the training and learning that occurs on jobs from both an economic and comparative international perspective. Will investigate the scale of the training enterprise, how it is accomplished, why some companies and nations train much more than others and what impact training has on organizational performance and national competitiveness. Training will also be examined from the worker's perspective, the distinction between training and learning, how individuals influence the amount of training they receive and what determines the amount and kind of training they desire. The training institutions and customs of countries like Japan, Sweden, Germany, France, and the United Kingdom will be compared to their American counterparts and an effort will be made to understand why investments in employer training are so much more substantial in Japan and Germany than in the United States and whether there is any role for public policy in the stimulation or improvement of employer training.

ILRHR 659 Internal Staffing: Managing Careers in Organizations
Spring 1996. 4 credits. Limited to 25 students. Prerequisites: ILRHR 260/560 or equivalent and one course in statistics.
T. Judge.
Analysis of the movements of people within organizations and the management of career development processes. Selected topics include determinants of career success, career planning methods and techniques, career and life stages, mentorships, glass ceilings, midlife career changes, career and family integration, criteria for internal analyses. During the semester, students will examine various aspects of human resource management issues and PC-based solutions. This course is a prerequisite to several advanced Human Resource Management electives.

ILRHR 653 Transforming Human Resource Management
Fall 4 credits. Limited to 25 students, seniors and graduate students only. Prerequisites: ILRHR 260/560, two human resource management electives. Permission of instructor. G. Milovich.
In this course we examine change in HRM as a field of study, a function with organizations, and as a career choice. Theories and research related to changes in HRM will be the primary focus. Trends in the field reflect responses to a wide variety of pressures. Trends represent choices the various stakeholders make, and in turn these choices shape the future of HRM. HRM's historical evolution, its role in changing employment relationships, and its function in new organization forms such as decentralization, federal, networks, joint ventures, and semi-autonomous teams will be studied.
ILRHR 661 Organizational Development Methods
Spring 1996. 3 credits. G. Thomas.
An experiential course that deals with OD and its role in the organizational change process. Combines the opportunity for hands-on practice in a workshop setting. Students will have responsibility for researching and writing a paper that examines a specific method, technique, or critical issue; an in-class demonstration/presentation illustrating applications of a chosen subject; and a final project requiring a comprehensive proposal that describes an appropriate and logically supported intervention strategy.

ILRHR 665 Transforming Human Resource Management: Case Studies
Spring 1996. 4 credits. Limited. Prerequisites: ILRHR 260/560 plus two other courses in human resource studies and permission of instructor. G. Minkovitch.
An analysis of HR management strategies and policies and their impact on organizational objectives and the well-being of employees. Cases, incidents, and field data derived from a variety of organization settings provide a framework for examining and understanding the various effects of human resource management decisions. Students with a special interest in HRM are encouraged to use this course as a "capstone" to their studies.

ILRHR 666 Cost-Benefit Analysis for Human Resource Management
Spring 1996. 4 credits. Prerequisites: ILRHR 260/560 or equivalent, one course in statistics, one elective in human resource studies, and permission of instructor. J. Boudreau.
Explores how to account for the contribution of human resource management programs and decisions to achieving organizational goals. It emphasizes a systematic decision-making system that organizes the discipline of human resource management and can assist in planning and evaluating programs. Topics include the role of financial-accounting statements in managing human resources, cost-benefit analysis for programs, managing human resources as a profit center, and identifying human resource management constituents to address their goals.

ILRHR 667 Employee Relations
Spring 1996. 4 credits. Prerequisites: ILRHR 260/560 or equivalent and permission of instructor. L. Dyer.
Explores the policies, programs, and practices used by employers to promote the just and humane treatment of employees, especially managerial, professional, and other employees not covered by collective bargaining contracts. Includes such policies as the protection of employee rights and the nature of processes used to allocate organizational opportunities and rewards; such programs as employee assistance plans and due process procedures; and elements of such practices as employee communication and supervision. Treats these as a "package" to be considered in totality and developed strategically. Considers variations in employee relations strategies, the motives of employers in establishing such strategies, and the effects of these strategies on relevant individual and organizational outcomes.

ILRHR 668 Staffing: Employee Selection and Utilization
Fall 1995. 4 credits. Limited to 25 students. Prerequisites: ILRHR 260/560 or equivalent, one course in statistics. ILRHR 268 recommended. T. Judge.
An analysis of the staffing process as applied to employing organizations. Topics include recruitment, selection processes and techniques, legal issues in selection, international issues, and evaluating the effectiveness of staffing decisions.

ILRHR 669 Managing Compensation
Fall 1995 and spring 1996. 4 credits. Limited to 30 students. Prerequisites: ILRHR 260/560 or equivalent, ILRHR 266 and basic statistics or permission of instructor. G. Milkovich.
Major emphasis is on the decisions and issues involved in the design and administration of pay systems. Topics include behavioral and economic theories and research related to compensation, administration, and factors influencing decisions about pay levels, hierarchies, forms, and administration of pay. Also focuses on the effects of various pay systems on employee behaviors and firm performance.

ILRHR 690 Comparative Human Resource Management
Spring or fall. 4 credits. Prerequisites: ILRHR 260/560, or permission of instructor. V. Puck.
The course surveys human resource practices in key countries and regions of the world: Germany, U.K., France, Eastern Europe, Japan, and ASEAN. The focus is on issues related to management of professional and managerial work force, such as selection and staffing, development, and appraisal and reward systems. Special attention is given to current changes and trends in the human resource management area (e.g., Europe 92, transformation in Eastern Europe, globalization of Japanese firms). Implications for multinationals operating in these countries will also be discussed.

ILRHR 691 Human Resource Planning and Strategy
Fall 1995. 4 credits. Limited. Prerequisites: ILRHR 260/560 or equivalent, one course in statistics, and permission of instructor. L. Dyer.
Covers the content of human resource strategies and the process of human resource planning. The emphasis is on developing human resource strategies that are integrated with firm business strategies. Covered are methods and techniques used to forecast and plan for organization structures and processes, work force population, employee participation and contribution, and employee morale. Much of the course is organized around a computer simulation game in which students make policy and program decisions for a fictional organization. Outcomes are evaluated on the basis of their contributions to the organization's human resource and profit objectives.

ILRHR 692 Training the Displaced and Disadvantaged
Fall or spring. 3 credits. Prerequisite: permission of instructor. J. Bishop.
Examines public and private efforts to lower unemployment and underemployment of displaced and disadvantaged workers. The seminar examines the scope of the problem, its causes, and why specific programs have worked and others have not. Topics covered will include training for displaced workers, rehabilitation of the disabled, job-search training, tax credits for hiring disadvantaged workers, training, literacy instruction, EEO, public service employment, assisting new business, and industrial policy. The seminar also investigates how the structure of the economy influences the ability of targeted training and job creation to achieve sustained reductions in unemployment and draws lessons from the experience of other societies.

ILRHR 693 Design and Administration of Training Programs
Spring. 3 credits. Prerequisites: ILRHR 260/560 or permission of instructor. J. Boudreau.
The purpose of this course is to acquaint students with various aspects of the training and development function in organizations. A systems approach is used to help students understand how to determine that a training problem exists, how to conduct a training needs assessment, issues regarding the design of training programs, a review of current training techniques and methods, development strategies, financial and evaluation strategies, and the role that training plays for U.S. firms and labor unions in trying to become more competitive in the world economy. After completion of this course, students should be familiar with current views of the Human Resource Development function and profession, current theoretical models of training and adult learning, and the management of an effective HRD function within the current business environment.

ILRHR 694 Human Resource Information System Applications
Fall 1995. 4 credits. Limited to 22 students. Prerequisites: ILRHR 260/560 or equivalent, ILRHR 266; at least one upper-level HRS elective; basic statistics; and permission of instructor. G. Thomas.
Explores the development, implementation and management of computerized personnel information systems and their use in human resource management. Theories and concepts relevant to the design and implementation of such systems are presented and used as the framework for hands-on experience with personal and mainframe computer systems. Students create and use applications of current popular human resource software to design their own applications and present them to the class. Where possible, student applications are based on field work in actual organizations.

ILRHR 695 Education, Technology, and Productivity
Fall. 3 credits. J. Bishop.
The seminar investigates the nexus between the education and training occurring in schools and at the workplace and the technological progressiveness, productivity, and competitiveness of firms, individuals, and nations. We will investigate (1) how technological progress is changing the nature of work and what this implies for reform of education and training, (2) why United States productivity has not increased in the past fourteen years, (3) how education and training contribute to the growth and competitiveness, (4) why educational achievement has declined, and (5) how the responsibility for education and training can be apportioned among individuals, firms, private nonprofit organizations, and government.
ILRHR 696 Human Resource Management and Government Regulations
Fall. 4 credits. Limited to 25 students. Prerequisite: ILRHR 260/560 or equivalent. T. Judge, T. Welbourne.
A survey and analysis of government legislation and regulations affecting human resource management in nongovernment organizations, examining the framework within which management must operate. Government agencies' methods of enforcement of such regulations and the firms' responsibilities for failure to comply with these legal requirements are considered. Emphasis will be on human resource policy development and administration to meet legal requirements. Topics include Title VII, Affirmative Action, FLSA, OSHA, ERISA, Employee Rights, Employment at Will, Worker's Compensation, and recent legislative developments.

ILRHR 697 Special Topics in Resource Studies
Fall or spring. 3 credits. Staff
The areas of study are determined each semester by the instructor offering the seminar.

ILRHR 698 International Human Resource Policies and Institutions
Fall. 3 credits. J. Bishop.
A comparative study of human resource policies and institutions in Western Europe, North America, Japan, and East Asia (with special emphasis on math and science education) and of the effects of these institutions on productivity, growth, and equality. The institutions studied include primary and secondary education, apprenticeship and higher education. Data on the consequences of policies is presented and an effort made to understand how human resource policies and institutions have contributed to the rapid growth and low levels of inequality in Europe, Japan, and the Pacific Rim nations. Another focus of the course is understanding the causes of the high levels of achievement of American high school students relative to their counterparts abroad.

ILRHR 699 Contemporary European Labor Markets
Spring. 3 or 4 credits (1 additional credit available for those who elect to prepare a special report). J. Bishop.
Aggregate unemployment rates in Europe have risen from 3-4 percent in the 1960s to 11 percent in the late 1980s. The course is an examination of the causes and consequences of this transformation of European labor markets. In the process of addressing these questions, we review the recent history of these economies, their labor market institutions, and government labor market policies in a comparative framework. Some European nations—Sweden, Norway, Switzerland, and Austria—have kept their unemployment rates low and the reasons for their success will be explored. The question of why economies that performed so poorly in the 1960s are performing so poorly now can only be addressed in the context of an overall theory of unemployment. The course examines the debate that currently rages over the causes of European unemployment and between the advocates of Keynesian, new classical (rational expectations and real business cycle theorists), and new Keynesian (efficiency wage, implicit contracts, and overlapping contracts) theories of aggregate unemployment.

ILRHR 760 Seminar in Human Resource Studies
Fall or spring. 3 credits. Prerequisites: ILRHR 560, ILRST 510/511, and ILRHR 669 and permission of instructor. Staff.
A "floating" seminar designed to give faculty and students an opportunity to pursue specific topics in detail. B. Gerhart, discussion on theory and research. Topics vary from semester to semester. Interested students should consult current course announcements for details.

ILRHR 762 Research Methods in Human Resource Studies
Fall or spring. 3 credits. B. Gerhart.
Designed to build social science research skills, particularly in the area of human resource studies (HRS). Topics include measurement reliability, construct validity, design of studies, external validity, meta-analysis, critiquing/reviewing HRS research, publishing HRS research, and applications of statistical models of HRS issues.

ILRHR 763 Human Resource Strategy for Competitiveness
Spring. 3 credits. Prerequisites: ILRHR 560, ILRST 510. T. Welbourne.
Review of empirical and conceptual work in the field of human resource management strategy, which proposes that HRM decisions should be directly linked with business strategy. Will consider HRM as an organizational system and how it can support a variety of business strategies. In addition to reviewing the literature on this topic, time will be devoted to applying what is learned about the field to a variety of developing issues facing businesses today. Human resource strategies to support total quality management, high technology organizations, mergers and acquisitions, downsizing, and small businesses will be studied.

ILRHR 764 Theory and Research on Staffing and Career Management
Spring 1996. 3 credits. Prerequisites: ILRST 510 and 511 and permission of instructor. Staff.
Research seminar that considers recent developments in theory and empirical research concerning staffing and career management. Topics covered in this course are the following: recruitment, job choice, evaluation of employee selection procedures (e.g., employment interviews, personality tests, biodata, assessment centers, drug and honesty tests), determinants of career success, politics, the glass ceiling, mentoring, integrating work and family, and stress. Readings will consist of journal articles and research reviews on each topic. Class discussion will emphasize critical analysis of past research and how to publish research in this area. Course requirements consist of class attendance and participation and completion of a research paper or proposal.

ILRHR 769 Topics in Compensation Theory and Research
Fall 4 credits. Prerequisite: ILRHR 669.
G. Milkovich, B. Gerhart.
Examines recent developments in theory, research, and practice related to compensation. Discussion emphasizes the relevance of theory and research to compensation decision making. Topics include strategic perspectives, variable compensation including gainsharing, bonus, spot awards, etc., risk and leverage in pay, egalitarian and meritocratic structures, and the relationship between pay, employee behavior, and organization.

ILRHR 790 ILR M.P.S. Program
Fall and spring. 2 credits. Staff.
Supervised research only for those enrolled in the ILR M.P.S. program.

ILRHR 798 Internship
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 799 Directed Studies
For description, see the section on Collective Bargaining, Labor Law, and Labor History.

ILRHR 960 Workshop in Human Resource Studies
Fall 1995 and spring 1996. 2 credits. Enrollment limited to M.S. and Ph.D. candidates. S-U grades only. Staff.
The workshop is designed to provide a forum for the presentation and critical discussion of current research being undertaken by graduate students, faculty members, and invited guests in the field of human resource studies. All M.S. and Ph.D. candidates in the Department of Human Resource Studies are urged to enroll; candidates in other departments are cordially invited. Each participant will have an opportunity to benefit from the collective wisdom of the others in the formulation, design, and execution of his or her research, as well as to become current on the latest developments in the field.

INTERDEPARTMENTAL COURSES

ILRID 150 Freshman Colloquium
Fall. 1 credit. Open only to ILR freshman. S-U only. Staff.
This course is offered: a) to acquaint new freshman students with some of the issues and disciplines in the field of industrial and labor relations; b) to establish acquaintanceship among members and the ILR faculty and students an opportunity to pursue specific topics in detail. B. Gerhart, discussion on theory and research. Topics vary from semester to semester designed to introduce issues encountered in studying the employment relationship.

ILRID 451 Science, Technology, and the American Economy
Spring. 4 credits.
The industrial revolution did not begin in the United States, but the nation became the world's first technological society. Attention will be given to the evolutionary confluence of science, technology, mathematics, and capitalism in the formation of the U.S. economy, its institutions, and its labor force. Primary attention will be given to the post-World War II economic developments. The vantage point will be the linkage with employment, unemployment, income, and productivity considerations. Public policy issues (such as research and development policy, national defense influences, the "agricultural revolution," savings and investment rates, labor force preparedness) will be explored. The industrial and human resource policies of other nations as well as the implications of the globalization of technology in the future will also be discussed.
ILR EXTENSION 281

ILR 452 Writing in Industrial and Labor Relations
Fall or spring. 3 credits.
Will require close reading of four books related to the term's theme in the field of industrial and labor relations and careful writing about them. Students will also have an opportunity to practice writing about the world of work for different audiences.

ILRUD 790 ILR M.P.S. Program
Fall and spring. 1-9 credits.
Supervised research only for those enrolled in the ILR M.P.S. program.

ILR EXTENSION

Metropolitan
The following courses are open only to participants in the Extension Division in New York City. These courses are not open to undergraduate or graduate students matriculated in the ILR programs. ILR Credit and Certificate Program courses at the Labor College are offered for four credits. Courses and course credits earned in Extension Division certificate programs are not automatically accepted as transfer credit in the ILR programs or as a basis of admission to the resident ILR undergraduate and graduate programs in Ithaca. Student applications for course transfer are evaluated by the ILK school on an individual basis.

210 Statistical Reasoning I
Fall or spring. 4 credits.
An introduction to the basic concepts of statistics, measures of location and dispersion, estimation and confidence intervals, hypothesis tests, regression and correlation. Students are taught to use a computer at the beginning of the term and use it for weekly assignments.

260 Personnel Management
Fall or spring. 3 credits.
Focuses on management of personnel in organizations. Deals with manpower planning, recruiting, selection, wage and salary administration, training, performance appraisal, organizational development, and the administration of personnel department activities. Special attention is paid to government manpower policy and its implication for personnel management.

301 Labor Union Administration
Fall or spring. 3 credits.
A review of the operations of American unions, including a general theoretical framework but with major emphasis on practical operating experience. The course will consider the formal government of unions; organizational or institutional purposes and objectives and how these are achieved; underlying structure and relationship among members, locals, and national organizations; the performance of the primary function of organizing; negotiating; contract administration; and the effect of the Landrum-Griffin Act.

326 Sociology of Occupations
Fall or spring. 3 credits.
Focuses on (1) the changing character of American occupations within the context of social change; (2) occupational status—differences in income, prestige, and power and the recent 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 careers and organizational patterns of other occupations. A major sociological theme is the relationship between occupational structure and workplace structure.

343 Health in the Workplace
4 credits.
Examines the state and federal laws that affect job safety and health, and the way workers and their unions can use legislation to promote safe and healthy working conditions. Topics include safety and health standards; the enforcement of laws and standards; the responsibilities of management, the rights of employees and their unions, including the rights to information; collective bargaining for safety and health; racial- and gender-based discrimination regarding hazardous work; and drug testing.

346 Economics of Collective Bargaining
Fall or spring. 3 credits.
Economic aspects of the negotiation, terms, and effects of collective bargaining agreements at the individual firm, industry regional, and national levels. Topics examined include forces influencing contract demands and terms, employee adaptation to higher wages and benefits, industry differences in competitiveness, firm size, and markets; regional location of industry; international competition; government regulations, labor supply; inflation, recession, and unemployment.

350 History of Industrial Relations in the United States
Fall or spring. 3 credits.
This review of the history of industrial relations in the United States emphasizes developments in the twentieth century. The course concentrates on the American worker, both union and nonunion, labor movements; and the environmental forces that have shaped industrial relations in the United States. Readings are selected from scholarly accounts and original sources.

351 Collective Bargaining
Fall or spring. 3 credits.
A comprehensive study of collective bargaining, the negotiation scope of contracts; the day-to-day administration of contracts; the major substantive issues in bargaining, including their implication for public policy; and the problem of dealing with industrial conflict.

352 Labor Relations Law and Legislation
Fall or spring. 3 credits.
A survey of the law governing labor relations. The legal framework in which the collective bargaining relationship is established and bargaining takes place is analyzed. Problems of the administration and enforcement of collective agreements are considered, as are problems of protecting individual employee rights in the collective labor relations context. Also serves as an introduction to the legal system and method and to legal and constitutional problems of governmental regulation of industrial and labor relations.

367 Safety and Health in the Workplace
Fall or spring. 3 credits.
To provide basic education and training in workplace safety and health. The course will focus on applicable federal and state laws, standards for health and industrial hygiene, and such health concerns as asbestos, radon, and AIDS. Practical experience will be provided through workplace walk-through safety and health inspections and in use of industrial hygiene equipment that measure noise, temperature, humidity, airflow, and airborne toxics.

400 Union Organizing
This course explores various aspects of unions' attempts to organize workers; why some workers join unions and others do not; the techniques used by both unions and employers during organizing campaigns; and the present state of laws organizing and proposed amendments to the law.

440 Health, Welfare, and Pension Plans
Fall or spring. 3 credits.
An analysis and appraisal of private health, welfare, and pension plans. A consideration of the origin and development of employer, union, and joint programs and a critical examination of the financing, administration, and general effectiveness of the plans.

602 Arbitration
Fall or spring. 3 credits.
A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices; the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of an arbitration hearing, and the preparation of an arbitration opinion.

681 Labor Relations Law
Fall or spring. 3 credits.
An advanced course in labor law, covering such topics as emergency labor disputes, legal problems of labor relations in public employment, labor and the antitrust laws, civil rights legislation, rights of individual employees and union members, and legal problems of union administration.

684 Employment Discrimination and the Law
Fall or spring. 3 credits.
An examination of legal problems involving employment discrimination based upon race, color, religion, sex, national origin, or age. The impact of developing principles of law on preemployment inquiries and testing, seniority and promotions, and other personnel policies, practices, and procedures will be discussed. The prerequisites of affirmative action under Executive Order No 11246, as amended, will be analyzed. Special attention will be given to the role of state law in resolving employment discrimination claims and the procedural framework for raising and adjudicating such claims before administrative agencies and the courts.

687 Current Issues in Collective Bargaining
Fall or spring. 3 or 4 credits.
An intensive study of the most significant current issues and problems facing employers and unions in their relations with each other, with particular emphasis on the substantive matters in contract negotiations and administration of the provisions of collective bargaining agreements. A major research paper is usually required.

Statewide
The following courses are open to participants in the Extension Division's statewide credit programs in labor studies and management studies. Extension offices are
based in Buffalo, Albany, Rochester, Ithaca, New York City, and Long Island. These courses are not open to undergraduate or graduate students matriculated in the Ithaca IHR programs.

208 Workplace Negotiations
Fall or spring. 3 credits.
Will cover the theory and practice of negotiation as it applies to workplace and business situations. Students will be exposed to theoretical models of negotiation and will participate in negotiation exercises. Students will be participating in two negotiation exercises and will be asked to write a paper on their negotiating position in each exercise. More weight will be given in grading to the student's ability to present a well-thought-out rationale for positions and tactics than to the outcome of the negotiation itself.

241 Arbitration
3 credits.
A study of the place and function of arbitration in the field of labor-management relations, including an analysis of principles and practices, the law of arbitration, the handling of materials in briefs or oral presentation, the conduct of an arbitration hearing, and the preparation of an arbitration opinion.

242 Public Sector Collective Bargaining
Fall or spring. 3 credits.
This course is designed as an introduction to collective bargaining in the public sector. The course examines the historical development of bargaining in public employment, the evolution of state and federal and bargaining theory and practices, as well as impasse resolution techniques frequently found in this sector. Special emphasis will be given to developing an understanding of the similarities and differences between public and private sector bargaining and how they have affected tactics and strategies employed by the parties.

243 Growth of American Business and Management History
Fall or spring. 3 credits.
The growth and cycles of American business enterprise produced significant changes in education, government, work, the family, the ethnic composition of the population, and the landscape. As business and industry expanded, new methods evolved for managing these enterprises. This course will examine the development of managerial practices, the relationship of management to the work force, and the social ramifications of capitalist expansion.

245 Public Sector Labor Law
3 credits.
A survey and analysis of the New York State Public Employees Fair Employment Act is made as well as a comparison with other state laws covering public employees. The course will examine the extent to which the law protects and regulates concerted actions by employees in the public sector. The intent is to study and understand the law as written, but more importantly how it has been interpreted by the courts of New York State in its application. Major emphasis will be on employee and employer rights, including recognition and certification, improper practices, strikes, grievances, and disciplinary procedures of the New York State Public Employment Relations Board.

247 Labor and the American Economy
3 credits.
Will help the student understand how economic theories relate to the economic problems confronting the American citizen in general and the American union member in particular. Emphasis will be placed on contemporary economic theories and how their proponents attempt to solve American economic problems.

248 Employment Practices Law
Fall or spring. 3 credits.
Considers laws and regulations that impact directly on managers and employers. Students will examine issues and laws such as Equal Employment Opportunity, Employee Retirement Income Security Act, Federal Wage and Hour Laws, Occupational Safety and Health Act, unemployment laws and other topics. Students will focus on the practical application of laws and their impact on the workplace.

250 New York Workers' Compensation Law for Trade Unionists and Injured Workers
Fall or spring. 3 credits.
There is a collective perception that the Worker's Compensation system in New York compounds an injured personal predicament with Byzantine responses that lead to despair. Unions and injured workers' organizations believe that, if properly empowered, they can be just as effective as lawyers in looking after their injured colleagues' claims. This course is structured to meet both of these realities. We will delve into every nook and cranny of New York Worker's Compensation law. The course will be entirely practical. Skills teaching, i.e., explaining how to present a case, decorum, ethics, and persuasiveness, are built into the course. Experts on how the system really works will also be used.

251 Principles and Practices of Management
Fall or spring. 3 credits.
Presents the theory and processes of management with an emphasis on supervision. Management functions of planning, organizing, staffing, and evaluating are included. Concepts and theories are presented, and case studies are analyzed. Motivating people, exercising leadership, and effectively developing employees are emphasized.

252 Contract Bargaining
Fall or spring. 3 credits.
Examines the principles of contract bargaining, including bargaining environments and structures as well as standards used in bargaining. Students will learn to prepare bargaining demands, cost economic items, draft noneconomic contract language, negotiate economic and noneconomic issues, and resolve a contract bargaining impasse. The course will consider the impact of contract bargaining outcomes on workers, unions, employers, and the public.

253 Contract Administration
Fall or spring. 3 credits.
Focuses on the role of the steward in administering the union contract in the workplace. Includes grievance and arbitration contract clauses, the grievance procedure in practice, the role of the union steward, the role of local and international unions, negotiation of grievances, and preparation for arbitration. Students will analyze the impact of grievance and arbitration procedures on workers, unions, and employers.

254 Labor Law
Fall or spring. 3 credits.
Examines the principles of labor law by looking at social philosophy and the historical context of federal labor legislation from the 1930s. Students will concentrate on major provisions of the National Labor Relations Act, examining how the National Labor Relations Board and the federal courts have interpreted the federal labor laws. Discussion will include new directions in labor legislation and interpretation with consideration given to the impact of labor law on workers, unions, and employers.

256 Dispute Resolution
Fall or spring. 3 credits.
Examines third-party participation in dispute resolution in private and public sector collective bargaining. Development of dispute resolution methods in American labor relations; issues and practices in neutral, binding arbitration of grievances and mediation; conciliation; and fact finding procedures will be discussed. We will also look at exclusive labor-management mechanisms to settle industry disputes.

257 Human Resource Administration
Fall or spring. 3 credits.
Designed to provide an overview of personnel practices in the modern organization. It will focus on manpower planning, employment, training and development, motivation and compensation, and performance appraisal and communication for students who are currently supervisors or personnel practitioners or for those aspiring to those positions.

258 Organizational Behavior
Fall or spring. 3 credits.
Designed to illustrate how behavioral science theory leads to research and how theory and research provide a basis for practical application in business, industry, education, and government.

259 Union Administration
Fall or spring. 3 credits.
Focus is on the principles and practices of effective union administration. Students will study the dynamics of democratic organizations and the development of organizational leadership. The course explores alternative methods of decision making and lines of responsibility. The legal obligations of unions and union officials will be discussed and analyzed. The course also examines the structure and evolution of relationships inside the labor movement.
264 Contemporary Labor Problems
Fall or spring. 3 credits.
A survey of the major challenges that confront the American labor movement. Students are briefed on the background of each problem and discuss and analyze a broad range of solutions proposed by the experts.

266 Professional Writing: The Power of the Written Word in Business
3 credits.
Focuses on the importance of developing effective writing skills and strategies required to be successful in business communities. Students will sharpen existing writing skills, correct bad writing habits, and develop new writing habits through “real life” exercises taken from case studies and their own experiences. In addition, they will learn the importance of using rhetorical strategies such as defining situations requiring written responses, writing to a specific audience, attending to a specific purpose, choosing the appropriate language, and varying tone and style as the situation demands. Students, upon completing this course, will have the confidence and the writing skills to successfully address most situations requiring written communication. Genres include memos, proposal letters, and reports.

267 Speaking and Listening for Business and the Professions
3 credits.
The overall objective is to equip participants with the skills and knowledge they need to speak and listen effectively. By the end of the course, students should be able to listen to, and interpret, oral communication; identify major causes of listening misunderstandings such as biases, distractions, emotions, etc.; describe and employ techniques for overcoming those listening barriers; speak effectively in front of an audience; describe ways to build rapport with an audience; persuade an audience; use visual aids effectively; introduce speakers, make presentations, and speak extemporaneously.

269 History and Future of Work
Fall or spring.
Explores the evolution of contemporary business operations. Discussion will focus on historical and present-day theories of work organization, changes in the workplace and workforce, and future trends. The relationships between businesses and the societies in which they exist, in both local and global economies, will also be examined.

359 Directed Studies in Labor Education
Fall or spring. 3 credits.
Designed to grant credit for fieldwork under the direction of members of the faculty. Third semester of an intensive training program in labor education for mature students with demonstrated ability to undertake independent work who have been carefully screened and selected for participation in this course. Combines 180 hours of fieldwork in a union education or related program with 3-hour seminars in the classroom. Classroom meetings are devoted to (1) in-depth analysis of union experiences in relation to labor education, theory, method, and techniques, and (2) individual consultations.

364 Labor, Government, and Politics
3 credits.
A survey of the ways the American political system affects labor and how organized labor affects the system through voting, political parties, and interest groups.
LAW SCHOOL

ADMINISTRATION
Russell K. Osgood, dean of the law faculty and professor of law
Robert A. Hillman, associate dean for academic affairs and professor of law
Claire M. Germain, law librarian and professor of law
Anne Lukingbeal, associate dean and dean of students
Charles D. Cramton, assistant dean for alumni/international affairs
Richard D. Geiger, assistant dean and dean of admissions
Harry B. Ash, director of development and public affairs
Nan A. Colvin, registrar

LAW SCHOOL
The primary function of the Law School is to prepare attorneys for both public and private practice who will render the highest quality of ethical and professional service to their clients and who will further legal progress and reform. 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. Students may be admitted to a program of study leading to the degree of Doctor of Law "with specialization in international legal affairs."

There are combined graduate degree programs with the Johnson Graduate School of Management, the Department of City and Regional Planning of the College of Architecture, Art, and Planning, the School of Industrial and Labor Relations, the graduate divisions in economics, history, and philosophy of the College of Arts and Sciences, and the Université de Paris I (Pantheon-Sorbonne), 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.

Each year the graduate program of the Cornell Law School admits a limited number of students, generally all from abroad. The L.L.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 seeking a degree.

For further information, refer to the Law School catalog, which may be obtained from the Office of the Registrar, Myron Taylor Hall.

FIRST-YEAR COURSES
500 Civil Procedure
502 Constitutional Law
504 Contracts
506 Criminal Law
507 Legal Process
508 Practice Training I
509 Practice Training II
512 Property
515 Torts

UPPERCLASS COURSES
602 Administrative Law
605 Advanced Civil Procedure
606 American Indian Law
609 Antitrust Law
612 Banking Law and Regulation
613 Bankruptcy
614 Business Combinations
616 Commercial Law
616 Comparative and Transnational Litigation
618 Comparative Law
619 Conflict of Laws
620 Constitutional Law II: The First Amendment
621 Constitutional Remedies
622 Consumer Law
623 Copyright Law
624 Corporate Counsel
625 Corporate Reorganizations
626 Corporations
627 Criminal Procedure
628 Current Topics at the Crossroads of Law and Finance (also NBA 551)
630 Directed Reading
631 Economics for the Lawyer
633 Employment Law
636 Environmental Law
638 Estate and Gift Taxation
640 Evidence
641 Family Law
643 Federal Courts
644 Federal Income Taxation
646 Feminist Jurisprudence
648 Injunctions
650 Insurance
653 International Commercial Arbitration
654 International Commercial Law
657 International Taxation
657 International Trade
659 Japanese Business Law
660 Labor Law
662 Land-Use Planning
664 Law and Medicine
668 Lawyers and Clients
674 Negotiation
675 Organized Crime Control
676 Private Justice: Arbitration and Other Forms of Dispute Resolution
677 Products Liability
679 Public International Law
680 Roman Law and Modern Civil Law Systems
681 Secured Transactions
682 Securities Law
684 Sports Law
686 Supervised Teaching
687 Supervised Writing
688 Taxation of Corporations and Shareholders
692 Trial Advocacy
694 Trusts and Estates

SEMINARS AND PROBLEM COURSES
700 African Americans and the Supreme Court
701 African Customary Law
702 American Legal Theory
704 Biblical Law
710 Constitutional Law and Political Theory
716 Employees in Corporate Governance
717 Employment Discrimination
718 Ethnic Conflict and International Law
719 European Private Law Seminar
720 European Union
725 Family Law Seminar
726 Federal Criminal Practice
728 Health Care Reform
730 Housing Discrimination Seminar
731 Immigration and Refugee Law
732 International Energy Transactions Seminar
733 Introduction to French Law
FACULTY ROSTER

Abrams, Kathryn, J.D., Yale U. Professor of Law and Associate Professor, Program on Ethics and Public Life. Alexander, Gregory S., J.D., Northwestern U. Prof.


Lecturers

Cook, Nancy L., J.D., Georgetown U. Senior Lecturer. Galbreath, Glenn G., J.D., Case Western Reserve U. Senior Lecturer. Miner, JoAnne M., J.D., U. of Connecticut. Senior Lecturer and Director, Cornell Legal Aid Clinic. Seibel, Robert F., J.D., Northeastern U. Senior Lecturer. Strom, Barry, J.D., Cornell U. Senior Lecturer.

Academic Library Staff


Members of Other Faculties Associated with the Law School

FACULTY ROSTER

Abrams, Kathryn, J.D., Yale U. Professor of Law and Associate Professor, Program on Ethics and Public Life. Alexander, Gregory S., J.D., Northwestern U. Prof.


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Academic Library Staff


Members of Other Faculties Associated with the Law School


Adjunct Faculty Members


Practitioners in Residence

Simon, Bruce, Pract.
More detailed information about these programs is available from the Office of Admissions and Student Affairs, Johnson Graduate School of Management, Malott Hall.

Students in other graduate programs and undergraduate students registered with the university are welcome in many classes. Since matriculated MBA students require certain courses for graduation, non-Johnson School students are not allowed to pre-enroll. During the first week of classes, registration of non-Johnson School students occurs on a space available basis.

UNDERGRADUATE ONLY

NBA 300 Entrepreneurship and Enterprise
This course provides a disciplined look at the entrepreneurial and small business management. It deals with the formation and the acquisition of enterprises from the viewpoint of individuals who desire to become the principal owners. Reviews include legal and tax aspects, valuation techniques, organization forms, and venture-capital sources, as well as planning techniques necessary to launch a successful venture.

NCC COMMON CORE COURSES

NCC 500 Financial Accounting
Fall. 3 credits. Johnson School core course. Enrollment limited. R. Libby, J. D'Souza.
An introductory accounting course that examines the subject from the viewpoint of users external to the organization. Topics include transactions analysis, the accounting cycle; financial-statement preparation, use, and analysis; revenue recognition and cost measurement; present value; and problems in financial-accounting disclosure.

NCC 501 Quantitative Methods for Management
Fall. 3 credits. Johnson School core course. Enrollment limited. J. McClain.
An introduction to decision making under conditions of uncertainty. Topics include descriptive statistics, probability theory, classical statistics, statistical decision theory, and simple and multiple regression analysis. Some knowledge of calculus required.

NCC 502 Microeconomics for Management
Fall. 3 credits. Johnson School core course. Enrollment limited. M. Waldman.
Microeconomic theory is introduced and applied to problems faced by managers. Specific topics covered include supply and demand, consumer behavior, pricing when a firm has market power, and the role of government. The class employs a lecture format and emphasizes problem solving. Grading is based on two midterms and a final exam.

NCC 503 Marketing Management
Fall. 3 credits. Johnson School core course. Enrollment limited. D. Stayman, J. Russo.
The course addresses controllable and uncontrollable marketing variables that managers in multiproduct firms face in today's business environment. Topics include market research, customer behavior, product planning, distribution, advertising and promotion, pricing, international and competitive strategy. Separate graduate and undergraduate sections are offered in the fall.

NCC 504 Management and Organizations
Fall, spring. 3 credits. Johnson School core course. Enrollment limited. P. Sherer, H. Haveman, D. Sally.
This course takes a resource-based approach to management by arguing that organizations should link their strategy to their internal resources and capabilities. This theme is developed by addressing: (1) the strategic value of internal resources and capabilities, (2) the role of human resources and organizational behavior in formulating and implementing strategy, and (3) the importance of structure and the design of organizations in formulating and implementing strategy. Included among the topics are: how firms create sustainable competitive advantage through internal resources and capabilities, what the best practices are for managing people, what effects best practices have on attitudes and behaviors, why putting the customer first is not necessarily best practice from a resource-based perspective, why organizational culture is central to organizational effectiveness, why the formal organizational chart and structure of an organization are important, how organizations innovate, how organizations change through rearchitecture and reengineering, what firms gain and lose through pursuing core competencies, and what firms gain through strategic alliances and networks. The course makes extensive use of case materials.

NCC 505 Managerial Finance
Fall, spring. 3 credits. Johnson School core course. Enrollment limited. Prerequisites: Completion of or concurrent enrollment in NCC 500 and NCC 501. J. Hass, R. Michaely, H. Bierman.
An introduction to business finance through theory and case studies. Topics include the capital-budgeting decision, portfolio theory, the asset-pricing models, capital structure, mergers and acquisitions, costs of capital, option pricing, and international finance.

NCC 506 Production and Operations Management
Fall, spring. 3 credits. Johnson School core course. Enrollment limited. Prerequisites: NCC 501 or permission of instructor. L. Robinson, K. Malik.
Operations management deals with the problems of producing and delivering goods and services, topics that are of strategic importance in almost every organization. Production scheduling is a significant problem for manufacturing firms; smooth work flow
and quality control are important in banking
operations; inventory control is crucial in large
retail establishments; and proper task
sequencing is a major problem in the
construction industry. The course deals with
those and other problems, from a managerial
viewpoint. The course is designed around
managerial problems in the operations area.
Students use case studies to improve skills in
problem identification.

NBA MANAGEMENT ELECTIVE COURSES

Accounting

NBA 300 Entrepreneurship And Enterprise
Fall, spring. 3 credits. Restricted to
undergraduate students. D. Ben-Daniel.
The course uses Cornell-developed case
materials and lectures to address entrepreneurial
management in start-up ventures and new
business development in existing companies.
Among the topics covered are valuation of
business, planning, obtaining resources,
management of growth, and cashing out.
Guest lecturers speak on specialized topics
such as corporate and patent law, bankruptcy
and work-outs, leveraged buy-outs, and
valuations of businesses. Students team up to
write and present business plans. The course
attempts to integrate marketing finance,
operations, and human-resource topics in the
context of high-growth business ventures. For
non-Johnson School students only. Johnson
School students see NBA 564.

NBA 500 Intermediate Accounting
Fall, spring. 3 credits. Prerequisite: NBA 500 or the equivalent.
M. Nelson, T. Dyckman.
The course is based on the essential concepts and
terminologies of financial accounting
introduced in the accounting core course.
Students learn to evaluate financial statements
through the use of case studies drawn from
actual corporate financial reports.

NBA 501 Accounting for Mergers and Consolidations
Spring, first half of semester. 1.5 credits.
Prerequisite: NBA 500 or permission of the instructor. R. Bloomfield.
The course focuses on accounting problems
related to equity financing, including equity
restructurings, hybrid securities, intercorporate
investments, consolidated reports, proforma
statements for a merger prospectus, and other
related financial reporting problems. The
method of instruction is lecture mixed with
cases. Grading is based on two exams.
First half of semester. Course continues in NBA 508, Advanced Accounting, offered second half of semester.

NBA 502 Managerial Cost Accounting
Fall, spring. 3 credits. Prerequisites: NBA 500, NCC 501, and NBA 502, or the equivalent. R. Bloomfield, R. Hilton.
The course is designed both for those
responsible for internal accounting, for those
familiar with financial accounting
and those who use such information for
decision making. Topics include budgeting,
accumulating costs for product costing,
activity-based costing, standard costs, the
analysis of cost variances, cost estimation and
prediction, cost-price-volume decisions,
performance measurement, nonmanufacturing
cost analysis, cost allocation, and transfer
pricing. Instruction will be a mixture of lecture
case teaching and discussion. Student evaluation
will be based on a midterm exam, a final exam, a
project, and class participation.

NBA 503 International Accounting
Spring, second half of semester. 1.5 credits. J. Elliott.

NBA 505 Auditing
Spring. 3 credits. Prerequisite: NCC 500 or permission of the instructor. M. Nelson.
The course examines the process by which
financial-accounts systems are audited.
Topics include ethics, the meaning of audit
reports, the legal liability of auditors, the study
and evaluation of internal control systems, and
various approaches for testing account balances.
Problems, cases, and video
simulations are used to illustrate concepts.

NBA 506 Financial Information and Evaluation
Spring. 3 credits. Prerequisite: NCC 506, NBA 500 (or concurrent enrollment), or
permission of instructor. R. Bloomfield.
The course requires students to analyze and
defend investment decisions using publicly
available financial information. Decisions
involve stock valuation, credit analysis,
corporate restructuring, and business strategy.
Information sources include annual reports,
SEC filings, analyst reports, and the press.

NBA 508 Advanced Accounting
Not offered in 1995-56. 1.5 credits.
Prerequisites: NBA 501 or permission of the instructor. R. Libby.
The course examines advanced topics in
accounting for intercorporate investments,
including leveraged buy-outs, international
transactions and international subsidiaries,
joint ventures, spin-offs, and other related
financial reporting problems. The method of
instruction is lectures mixed with cases.
Grading will be based on two exams.
Second half of semester. Continuation of NBA 501.

Economics

NBA 520 Pricing and Strategy
Fall, spring. 3 credits. Prerequisite: NCC 502.
M. Waldman.
This course extends material introduced in the
macroeconomics course, where the focus
is on pricing decisions. The course is taught
very much like the core microeconomics
course; i.e., the course consists mostly of
application, rather than theory, is empha­
sized. Topics include the Box-Jenkins
method and more traditional forecasting methods, the prediction of turning points, combination of forecasts, and
the relationship of forecasting to decision making.
Application, rather than theory, is empha­sized.

NBA 524 Macroeconomics and International Trade
Fall, spring. 3 credits. Prerequisite: NCC 502 or equivalent.
R. Highfield.
The course applies basic macroeconomic
theory to such problems as inflation,
unemployment, economic growth, and
productivity and examines how those
problems interact with international trade and
finance. Students learn to be informed
observers of national and international
economic policies and discerning users of
economic analyses and forecasts. A lecture/
discussion format is used as the method of
instruction.

NBA 526 Business and Economic Forecasting
Not offered in 1995-96. 3 credits.
Prerequisite: NCC 501 or equivalent.
R. Highfield.
This course provides students with a toolbox of
useful, proven time-series forecasting methods
and teaches them how to choose the
appropriate one. Topics include the Box-
Jenkins method and more traditional
forecasting methods, the prediction of turning
points, combination of forecasts, and
the relationship of forecasting to decision making.
Application, rather than theory, is empha­sized.

NBA 527 Applied Price Theory
(also ECON 516)
Spring. 4 credits. Letter:S-U optional grading.
R. Frank.
The course emphasizes applications of the
principles of price theory to a variety of problems
taken from concrete, practical settings.

Finance

NBA 528 The Economics of Organization
Fall, spring. 3 credits. R. Gibbons.
Explores the roles of information, incentives,
and strategic behavior in shaping the internal
structure and practices of organizations.
Topics include the design and determination
and incentives (including performance pay,
distortionary performance measures, and
subjective performance assessments), human
resource management for general managers
(including labor market mobility, up-or-out
rules, and self-managed teams), and
organizational design and performance
(including communication, decentralization, and
re-engineering). Instruction is via lectures (about
50 percent, more toward the beginning) and
case discussions. Lectures often involve
mathematical models that are abstract but not
technical. Pedagogical strategy is to use
models as coherent frameworks for organizing
the welter of facts presented in each case.
Evaluation is via two take-home midterms
(involving problems related to models
discussed in class); five 2-page case write-ups;
one group project (including longer write-up and
class presentation); and class participation
(particularly in case discussions where no
write-up is required).
NBA 540 Financial Policy Decisions
Spring. 3 credits. Prerequisite: NCC 506 or the equivalent. H. Birneman.
An introduction to basic and advanced financial decision models, developed from the viewpoint of the issuing firm, for different methods of corporate financing. Topics include leases and bonds, preferred stock and convertible securities, common stock, capital structure and cost of capital, dividend policy, interest-rate swaps, leveraged buy-outs, and mergers and acquisitions. The format is lectures, discussions, and a few very brief case studies. Grades are primarily based on two examinations, but significant contributions in class are also relevant. Two to four visiting financial executives conduct classes.

NBA 541 Economic Evaluation of Capital Investment Projects
Fall, spring. 3 credits. Prerequisite: NCC 506 or permission of the instructor. B. Swaminathan, S. Smidt.
This course deals with the evaluation of capital investment projects under uncertainty. The first part of the course focuses on traditional capital budgeting techniques using the discounted cash flow approach. This involves the estimation of cash flows, the treatment of risk and discount rates, the role of inflation and the use of single-factor and multifactor asset pricing models in determining discount rates. The second part of the course focuses on the valuation of future investment opportunities of a firm using option pricing techniques. This includes issues such as flexibility options, options on real assets, evaluation of natural resource investments, and evaluation of new product investments. The methods of instruction are lectures, case discussions, spreadsheet exercises, statistical exercises, and seminars by practitioners. Students are evaluated on the basis of midterm and final examinations, assignments, and homework assignments.

NBA 542 Investments and Portfolio Analysis
Spring. 3 credits. Prerequisites: NCC 501 and NCC 502. Recommended: NBA 624. E. Jacquier.
The course is designed for students who not necessarily specializing in investment banking, yet majoring in finance. It covers the pricing of financial assets and instruments such as securities, bonds, options, and futures; the concepts of diversification, market efficiency, and risk-and-return relationships for (portfolios of) securities. The approach balances rigor and mathematical simplicity, but this is an essentially quantitative course. Students must be comfortable with statistics, regression analysis, and quantitative analysis as these tools will be routinely used from the beginning of class. Students should also be able to perform statistical analysis on computer packages (e.g., Minitab) and program worksheet packages (e.g., Lotus or Excel). The course is designed to give the students a good view of the paradigms of asset valuation and their implications for financial asset management. Students can elect to take either NBA 542 or NBA 551, but not both.

NBA 543 Financial Markets and Institutions
Fall, spring. 4 credits. Prerequisite: NCC 506 (Finance Core). M. O'Hara, W. Bailey.
The course develops a framework for discussing financial intermediaries. It analyzes the sources, uses, and pricing of funds in the economy and the various roles of banks and other financial intermediaries. Students explore the theories of commercial banking, study how operations affect financial institutions, and learn when lending can be securitized and how such markets work. They also learn how the money market and the financial-futures market operate. Quantitative techniques are used to model economic theory.

NBA 544 Bank Management
Spring. 3 credits. Prerequisite: NBA 543. M. O'Hara.
The course provides an in-depth treatment of management issues in commercial banking. Topics include risk management, credit decisions and pricing, information problems, bank performance evaluation, international lending, and strategic planning. Students learn concepts through case studies and participate in a bank-simulation exercise.

NBA 545 Corporate Financial Policy and Investment Strategies
Fall. 3 credits. Prerequisite: NCC 506 (Finance Core). R. Michaelis.
Students in the course will deal with frontier topics in corporate finance and investment strategy. The course objective is to enable students to better analyze financial situations that may be encountered in the future. From the perspective of either a corporate financial officer or an investor (such as a money manager), the basics for understanding corporate financial products is to understand the driving forces behind their creation. We analyze the factors that may affect corporate financial decisions: (1) taxes (both corporate and individual), (2) contracting (between managers and shareholders or other claim holders such as bond holders), (3) asymmetric information, and (4) transaction costs. We explore the effects of each of these factors on the decision about the optimal mix of debt and equity in the firm's capital structure and on its investments decisions. After mastering the basics, we move to more advanced topics such as M&A, Restructuring, Initial Public Offerings (IPOs), Seasoned Equity Issues, Convertible Debt, high-yield financing, and financial distress.

NBA 546 Introduction to Derivative Securities
Fall, spring. 3 credits. Prerequisite: NCC 506 (Finance Core) or permission of the instructor. B. Swaminathan, P. Carr.
The course introduces students to the pricing and hedging of derivative securities. The course briefly covers forward contracts, futures contracts, and swaps. The primary emphasis is on option contracts. Underlying assets include stocks, currencies, and commodities. Fixed income derivatives are covered in NBA 555. The method of instruction is primarily lectures, supplemented by guest speakers. A midterm and a final exam comprise roughly half the grade, with the remaining half determined by assignments, participation, and the trading game writeup/term paper.

NBA 551 Asset Valuation And Management
The course is designed for students specializing in finance. It provides a rigorous introduction to asset valuation, which is an essential foundation for the study of capital markets. Students study empirical papers that document the performances of financial models. Topics include the statistical analysis of portfolio risk and return, the equilibrium and arbitrage relationships between risk and return, and market efficiency. Investment policy deals with uncertainty, so students must be comfortable with statistics and regression analysis. Students can elect to take either NBA 542 or NBA 551, but not both.

NBA 552 Case Studies in Finance
Problems. 3 credits. Prerequisites: NBA 506 or the equivalent. Recommended: NCC 506 or the equivalent. NBA 540. Course is restricted to second-year or 12-month option students. Letter/S-U optional grading. H. Birneman, J. Hass. Students study real case situations. Most of the cases deal with corporate finance, but some treat other areas such as investment banking and securities investing. Issues raised in the cases are addressed in student presentations and class discussions. Several visitors from the business world will discuss
live cases. Teams present cases and also critique case presentations. Each team writes up a solution report for the case. Grades are based on case presentation, case reports, case critique, and class case discussions.

NBA 553 Finance and Accounting for Manufacturing
Fall. 3 credits. Course intended for non-Johnson School students only. J. D’Souza. The course focuses basic financial and cost accounting, valuation, and financial concepts that have a bearing on managerial decisions, and corporate financial policy issues. The goals of the course are: 1) to give students a working knowledge of the accounting process and the value and limitations of the data that comes out of the accounting information system, 2) to familiarize students with key concepts in cost accounting and the application of cost inflation to financial decision making. The teaching methods consist of lectures and cases. Students are evaluated on the basis of exams and case presentations.

NBA 554 International Finance
Fall. Spring. 3 credits. Prerequisite: NCC 506 (Finance Core). W. Bailey. This course applies principles of finance to the international setting. International finance is different in two basic respects. First, the existence of multiple currencies adds risk to investment and financing decisions. Second, when corporations and portfolio investors cross international borders, both problems and opportunities arise. We focus on these issues and highlight how finance theory can be extended to address them. We start with basic principles of international finance, then apply those principles to a variety of problems. The course helps students understand the ideas and research results of international finance and to apply what they learn to the practical problems of the increasingly globalized business world. The first part of the course introduces basic tenets of financial risk as they apply to businesses and their operations. Topics include personal property, contracts, agency, real property, and landlord-tenant law. Text readings and case studies are used. All students attending the course are expected to be professional accountants are required to take the course, and it is strongly recommended for finance students.

NBA 561 Business Law II
(also ARME 321)
Spring. 3 credits. Prerequisite: NCC 560 or permission of the instructor. D. Grossman. The course examines business organizations and the principles of commercial and corporate law affecting business. Topics include secured transactions, bankruptcy, commercial-paper, antitrust, consumer-protection, securities-law, and environmental-protection laws. Text readings and case studies are used.

NBA 562 Estate Planning
(also ARME 422)
Fall. 1 credit. D. Grossman. Fourteen sessions on the various aspects of estate planning. The law and use of trusts, the law of wills, federal and New York State estate and gift taxes, and probate procedures are covered.

NBA 564 Entrepreneurship and Enterprise
Fall. Spring. 3 credits. D. BenDaniel. The course uses Cornell-developed case studies and lectures to address entrepreneurial management in start-up ventures and new-business development in existing companies. Among the topics covered are valuation of business, planning, obtaining resources, management of growth, and cashing out. Guest lecturers speak on specialized topics such as corporate and patent law, bankruptcy and work-outs, leveraged buy-outs, and valuations of businesses. Students team up to write and present business plans. The course attempts to integrate marketing finance, operations, and human-resource topics in the context of high-growth business ventures.

NBA 557 Case Studies in Venture Investment and Management
Fall. Spring. 1.5 credits. Prerequisites: NCC 500 and NCC 506 or concurrent enrollment. W. Thomas. A series of cases that focus on the venture capital investment process and the subsequent management of such ventures. The primary perspective is that of the venture capitalist in assessing and evaluating information, preparing forecasts, assessing risks, developing and negotiating investment structure and terms, and deciding whether to invest. Cases also focus on management and financial problems and policy issues and the relationship between venture capitalists and entrepreneurs. The secondary perspective is that of the entrepreneur and the techniques and skills employed in managing growing enterprises. Presentations by venture capitalists and entrepreneurs will supplement student discussion and analysis of cases. Grades will be based on written reports, quality of classroom participation, and a final exam.

General Management

NBA 560 Business Law I
(also ARME 320)
Fall. 3 credits. D. Grossman. The course focuses on basic tenets of law as they apply to businesses and their operations. Topics include personal property, contracts, agency, real property, and landlord-tenant concerns. Text readings and case studies are used. All students attending the course are expected to be professional accountants are required to take the course, and it is strongly recommended for finance students.

NBA 567 Management Writing
Fall. Spring (sections offered in both first and second halves of semester). 1.5 credits. S-U grades only. B. Mink, A. Pike, M. Hittleman. Students learn to write clearly and effectively by focusing on perspective, style, organization, strategy, and persuasion. The seminar-style class is seven weeks long and limited to fifteen students, who write an assignment every week. Students consider style, organization, tone, and clarity by critiquing each other's work in class. A special section emphasizes producing cultural differences, is reserved for students whose native language is not English.

NBA 568 Oral Communication
Fall. Spring (sections offered in both first and second halves of semester). 1.5 credits. S-U grades only. B. Mink, A. Pike, G. Rosen. The course focuses on improving the presentation skills of management students. The course covers the areas of speaking formats (impromptu, extemporaneous, manuscript), delivery, organization, visual aids, and question/answer. Students receive feedback from classmates and the instructor, and have the opportunity to review in tutorials the videotapes of most of their presentations.

NBA 569 Management Consulting
Fall. 3 credits. A. MacAdams. The course is case-study oriented and focuses on strategic consulting. It has multiple objectives. First, it provides students with the opportunity to understand the role of the consultant and to gain indirect experience in that role through dealing with a broad range of practical and real-world issues. Second, it helps students improve their analytic skills through practice with case studies. Third, it provides students with information that they are unlikely to gain in other courses, as well as experience making group presentations and evaluating them. In addition, students are required to write a comprehensive analytic term paper.

NBA 571 Cornell Management Simulation
Fall. Spring. 1.5 credits. Restricted to second-year MBA students. S. Smith. This computer-based simulation is played by teams of four, self-selected students who make marketing, production, and finance decisions for one of five companies operating competitively in the same industry. After the first week, during which the rules of the simulation are explained and the software used by each team is demonstrated, the teams make weekly decisions (meeting at their own convenience) and receive feedback from the instructor. At the end of the simulation, each team writes a Strategic Intent paper and, before the results of the last decision have been determined, each team presents an in-depth analysis of its performance and its strategy for the future in a “Board of Directors” meeting. Letter grades only, based on the value created for the company's shareholders (relative to other firms in the same industry), the team's Strategic Intent paper and the instructor’s evaluation of team's performance at the BOD meeting.
NBA 574 Public Policy Issues  
Fall, first half of semester. 1.5 credits.  
Prerequisite: Basic understanding of macroeconomics. J. Jones.  
This public policy issues seminar will analyze the major institutions, procedures, issues, and public policy options available in making decisions affecting public and private organizations. Current and prospective economic conditions and challenges will be reviewed to provide a background for evaluating domestic and international monetary, fiscal, foreign trade and investment, and regulatory policy options in the context of an integrated world economy. Students will prepare an economic policy strategy paper based on the issues analyzed.

NBA 575 Advanced Consulting  
Spring. 3 credits. Limited to 20 students.  
Priority given to students who have taken NBA 569. A. McAdams.  
The course investigates the efficacy of "concept maps" as tools integral to the consulting process. In the first part of the course, recent case studies, both fictional and actual, are employed to review the use of concept maps in various settings. The settings following that, the research base documenting Professor Novak's use of concept maps in many other settings is examined. In the final part of the course, student teams undertake field projects designed to determine the potential contribution of concept maps in various business settings.

NBA 576 The World Geopolitical Environment of Business  
Fall. 3 credits. Letter/S/U optional grading. R. Lind.  
The geopolitical face of the world is changing at a pace that few could have envisioned even five years ago. The unification of Germany, the fall of communism and institutions of sweeping economic restructuring in the former Soviet Union, the move toward democracy with market economies in eastern Europe, the movement of Europe toward a unified economy, and the flirtations with reform and its implications in China are just a few of the many examples of the changing world economy. The course provides students with a view of those fast-paced worldwide changes. Topics covered include developments in western and eastern Europe, the former Soviet Union, the Pacific Rim, Central and South America, the Middle East, and Africa, and the role and fate of developing countries in the world economy. Guest speakers include leading scholars from Cornell and other universities and leaders in business and government.

NBA 577 The Political, Legal, and Regulatory Environment of Business  
Spring. 3 credits. Letter/S/U optional grading. R. Schuler.  
The political climate, laws, regulations and government arrangements for infrastructure have a profound effect on the nature, operation, and profitability of business. Many of the most important decisions that top management makes are driven by political, legal, and regulatory considerations (e.g., the responses of firms to the various corporate restructurings). The course provides students with a view of those fast-paced worldwide changes. Topics covered include developments in western and eastern Europe, the former Soviet Union, the Pacific Rim, Central and South America, the Middle East, and Africa, and the role and fate of developing countries in the world economy. Guest speakers include leading scholars from Cornell and other universities and leaders in business and government.

NBA 578 Business Ethics  
Fall. 3 credits. R. Frank.  
Students examine actual situations in business, both in the United States and abroad, that involve ethical issues affecting individuals and organizations. They are challenged to decide on appropriate ethical positions.

NBA 579 Cases in Business Strategy  
Fall, first half of semester. 1.5 credits.  
Restricted to second-year MBA students. J. Hass.  
Classic as well as new cases spanning a variety of industries and situations are used to develop an understanding and appreciation for several business strategy principles and dealing with issues such as ethical behavior, managing growth, employee empowerment, managing change and achieving innovation. A new case will be discussed in class each day, except the two or three days when an executive visitor is making a presentation. Students are expected to have prepared for and participate in the discussion. Each student will also participate twice in a four-person group that will be required to present or receive a case in a role-playing context on two Friday mornings during the last five weeks of the course. Letter grade only, based on individual research, class group performance, and a final paper.

International Management  
[NBA 583 Market Transitions in Eastern Europe]  
Not offered in 1995–96. 3 credits. D. Stark.  
The course examines the problems and prospects of the transition from state socialism to a market economy in contemporary eastern Europe. Patterns of investment, enterprise decision making, labor markets, and property rights are examined from a comparative institutional perspective. The final paper of the course is aimed at the interest of the seminar participants and includes such themes as privatization of state enterprises, the role of international monetary institutions, capital markets, new financial institutions, organizational restructuring, and the relationship between citizenship rights and property rights. Although the course focuses on recent changes in Hungary, Poland, and the Czech Republic, its content should yield insights for students interested in other societies (including China and the former Soviet Union) currently undergoing the transition from state socialism. Instructional methods used: discussion. Evaluation of students will be based on short papers on readings, class participation, a final paper and student presentations.

NBA 584 Management of the Multinational Corporation  
Fall 3 credits. Letter/S/U optional grading. V. Pucik.  
This course introduces students to analytical frameworks and skills used in international management. The first half of the class focuses on international strategy, including selection and implementation of a competitive position. The second half covers comparative management (two focus countries are chosen each semester) and cross-national management. Topics include motivation in an international context, cross-cultural communication, and multicultural operations. The course is a mixture of lectures and cases. Grading is based on two case write-ups, a midterm, a final, and class participation. There are no prerequisites, but a real interest in international management is needed to benefit from the class.

NBA 589 Business in Japan  
Spring (first half of semester). 2 credits. V. Pucik.  
The course, based primarily on case studies and lectures, focuses on the organizational capabilities and competitive strategies of Japanese firms in the context of business globalization. Two core areas will be reviewed in detail: intra-firm policies and practices common in Japanese industry, and their implications for globalization. The special emphasis will be on the changing business and human management issues and to their impact on strategy formulation and implementation. Each student will be required to choose a topic of his/her interest related to any of the main issues discussed during the course and write a written literature review. The review (10–15 pages plus bibliography) should not only summarize the key points of principal contributions reviewed, but should also contain their critical evaluation. Grading policy: 30% review paper, and 70% class participation.

NBA 590 Managing in Developing Countries  
Spring, first half of semester. 1.5 credits. Letter/S/U optional grading. J. Katz.  
This class centers on the unique features of industrializing countries as hosts for multinational business operations. It is a case-based course; each day is spent discussing one or two cases. Topics include environmental variation and how to deal with it and concentrated national power structures and their management. We cover a large number of countries spread throughout the world. Students are responsible for providing in-class updates on the countries discussed, because while the case content remains valid, some of the facts presented about the countries are out-of-date. Grading is based on the country update presentation, a final case write-up, and class participation.

Management Information Systems  
NBA 600 Database Management  
Spring. 3 credits. Prerequisite: Some knowledge of computing and systems, e.g., COM S 211. L. Orman.  
The course introduces the design, use, and management of computerized databases. Topics include physical and logical data structures, design issues, and retrieval, maintenance, and security problems. Students design, create, and use databases using various database management systems.

NBA 609 MIS Policy  
Fall. 3 credits. Prerequisite: Some knowledge of computing and systems, e.g., COM S 211. L. Orman.  
Design, use, and management of information systems are studied through examples. The seminar format places heavy emphasis on
class discussion and presentations. All major technologies and organizational objectives are studied in the context of MIS, policy, planning, and implementation.

NBA 610 The Information Revolution: Visions, Strategy
Spring, first half of semester. 1.5 credits. Letter/S-U optional grading. P. Pappas. Rapidly advancing information technologies are breaking down longstanding barriers to business productivity, innovation, and distribution. The resulting era of transformative change is called the Information Revolution. The purpose of this course is to prepare students for two decades of turbulent, high-stakes decision making driven by the Information Revolution. To accomplish this, the course provides: 1) A vision of the driving forces and developmental process of the Information Revolution; 2) An assessment of its many strategic implications to business, education, entertainment, and government; and 3) An approach to developing strategies to exploit the Information Revolution for competitive advantage.

Marketing

NBA 620 Marketing Research
Fall, spring. 3 credits. Prerequisites: NCC 501 and NCC 503, or the equivalent. R. Guha, V. Rao.
The course teaches students to identify information needs for developing marketing strategies and making tactical plans. They are introduced to up-to-date methods in research design and data collection, measurement, and analysis. They gain hands-on experience with such methods through problem sets and group projects. The course balances the viewpoint of researchers with that of managers who commission research.

NBA 621 Advertising Management
Fall. 3 credits. Prerequisite: NCC 503 (Marketing Core). D. Stayman. The course is designed to give students an understanding of the advertising and promotion management process. It covers the components of a successful advertising campaign and helps students develop an appreciation of the issues involved in advertising planning and decision making. They also learn about recent social-scientific findings and theory on how to facilitate advertising management.

NBA 622 Marketing Strategy
Fall. 3 credits. Prerequisite: NCC 503 (Marketing Core). V. Rao. The course balances theoretical and practical approaches to the development and evaluation of marketing strategies for multiproduct firms. It considers various environmental opportunities and constraints in developing and evaluating integrated marketing strategies for new and established products and services. Recent research results are applied to decisions on product-market boundary definition, resource allocation, product positioning, and competitive reactions. It includes selected topics such as brand equity, acquisitions, and lead-user analyses. Students use case studies extensively to develop skills in strategy analysis and to enhance skills in assessing external threats and opportunities by computer-assisted market simulation models and potential rival activity to develop marketing strategies for multiproduct firms. It considers various environmental opportunities and constraints in developing and evaluating integrated marketing strategies for new and established products and services. Recent research results are applied to decisions on product-market boundary definition, resource allocation, product positioning, and competitive reactions. It includes selected topics such as brand equity, acquisitions, and lead-user analyses. Students use case studies extensively to develop skills in strategy analysis and to enhance skills in assessing external threats and opportunities by computer-assisted market simulation models and potential rival activity.

NBA 623 Models and Methods for New Product Development
Not offered in 1995–96. 3 credits. Prerequisites: NCC 501 and NCC 503. D. Wittink. The successful introduction of new products requires careful planning and systematic screening and testing. This course covers models and methods that are useful to managers in the development of new products (e.g., specification of products and services) and marketing of new products. Heavy emphasis is placed on the measurement of consumer preferences. Students are required to complete a group project, consisting of a measurement instrument, data collection (from at least 30 respondents) and data analysis, for a self-chosen product category. The method of instruction consists of a combination of lectures and discussion of cases and articles. Performance is evaluated primarily based on exams and the group project.

NBA 625 International Marketing
Fall, spring. 3 credits. Recommended: NCC 503, J. Katz. International Marketing is designed to train students to take a domestic product and expand it into international markets successfully. Market selection, international marketing research issues, and international marketing strategies are all discussed. The term project (actually submitted in three parts throughout the term) requires that students choose some product and develop a plan for taking it abroad. The course test includes a series of short (1-3 page) case studies that are used as the basis of discussion in each class. Therefore, class preparation is essential. Grading is based on the term project, the final, and class participation. Core marketing provides a useful background, but is not a prerequisite.

NBA 626 Consumer Behavior
Spring. 3 credits. D. Stayman. The course examines ways in which affect, or feelings, can play a role in processes related to brand equity. It focuses on the influence of affect on the development, change, and maintenance of brand perceptions and brand loyalty. Topics include brand equity, variety seeking, product categorization, judgment, decision making, and risk preference. Those six areas are important in choices related to brand equity and brand loyalty (e.g., choosing brand-name products or value-priced ones, staying with a brand or switching). A prerequisite of NCC 503 is required.

NBA 627 Affect and Brand Equity
Not offered in 1995–96. 3 credits. A. Imen. The course examines ways in which affect, or feelings, can play a role in processes related to brand equity. It focuses on the influence of affect on the development, change, and maintenance of brand perceptions and brand loyalty. Topics include brand equity, variety seeking, product categorization, judgment, decision making, and risk preference. Those six areas are important in choices related to brand equity and brand loyalty (e.g., choosing brand-name products or value-priced ones, staying with a brand or switching).

NBA 630 Policies for Marketing Channels
Spring. 3 credits. Prerequisite: NCC 503. V. Kadiyali. Marketing channels are analyzed as a chain of interdependent and interlocking organizations that produce and deliver goods and services to various types of consumers. We will look at issues of moral hazard and adverse selection, and how these issues affect firm decisions for a firm interacting with current and potential rivals. We discuss how firms can, by their choice of appropriate decisions, act to signal to rivals their intentions and degree of commitment to them. We also look at sustainability, flexibility, and correction of decision choices. Game theoretic perspectives are used to understand these concepts. The dimensions of competitive strategy that we look at include product proliferation, R&D and patent policies, choice of compatibility with existing products, bundling of products, investing in capacity, vertical integration, choice of channels of distribution partners, pricing, and promotions. We also discuss problems caused in the optimal choice and implementation of firm strategies when information is imperfect. Specifically, we look at issues of moral hazard, adverse selection, and profit maximization in imperfect and perfect information.

NBA 631 Models and Methods for New Product Development
Not offered in 1995–96. 3 credits. Prerequisites: NCC 501 and NCC 503. D. Wittink. The successful introduction of new products requires careful planning and systematic screening and testing. This course covers models and methods that are useful to managers in the development of new products (e.g., specification of products and services) and marketing of new products. Heavy emphasis is placed on the measurement of consumer preferences. Students are required to complete a group project, consisting of a measurement instrument, data collection (from at least 30 respondents) and data analysis, for a self-chosen product category. The method of instruction consists of a combination of lectures and discussion of cases and articles. Performance is evaluated primarily based on exams and the group project.

NBA 632 Consumer Behavior
Spring. 3 credits. D. Stayman. The course examines ways in which affect, or feelings, can play a role in processes related to brand equity. It focuses on the influence of affect on the development, change, and maintenance of brand perceptions and brand loyalty. Topics include brand equity, variety seeking, product categorization, judgment, decision making, and risk preference. Those six areas are important in choices related to brand equity and brand loyalty (e.g., choosing brand-name products or value-priced ones, staying with a brand or switching). A prerequisite of NCC 503 is required.

NBA 633 Direct Marketing
Not offered in 1995–96. 3 credits. Prerequisite: NCC 503 Marketing Management, or equivalent. V. Rao, D. Stayman. The objective of this short course is to expose MBA students to selected contemporary issues in the area of direct marketing. In addition to pricing, we will look at issues relating to optimal marketing decisions for a firm interacting with current and potential rivals. We discuss how firms can, by their choice of appropriate decisions, act to signal to rivals their intentions and degree of commitment to them. We also look at sustainability, flexibility, and correction of decision choices. Game theoretic perspectives are used to understand these concepts. The dimensions of competitive strategy that we look at include product proliferation, R&D and patent policies, choice of compatibility with existing products, bundling of products, investing in capacity, vertical integration, choice of channels of distribution partners, pricing, and promotions. We also discuss problems caused in the optimal choice and implementation of firm strategies when information is imperfect. Specifically, we look at issues of moral hazard, adverse selection, and profit maximization in imperfect and perfect information.
Operations Management

NBA 641 Logistics and Manufacturing Strategy
Spring. 3 credits. Prerequisite: NCC 508, OR/IE 410, or permission of the instructor. E. Jacquier.
The course is about strategic management of the value chain, from materials to customer. Students discuss operations strategy issues that are important to both manufacturing and service businesses. The course requires written and oral communication skills. About a third of the classes are spent on case studies, with small groups presenting their analyses of them. There is one mid-term examination, but the majority of the grade is evaluated based on projects and class participation. There is an option of replacing some assignments with a "live case," a project with a local company.

NBA 642 Statistical Methods in Business
Spring. 3 credits. Prerequisite: Good performance in NCC 501 or the equivalent. E. Jacquier.
Regression analysis is one of the most abused quantitative techniques in the business world. Moreover, the field of econometrics is now hard to avoid for those who want to understand the theoretical literature of many areas of business, such as economics, marketing, and operations research. The course offers indispensable theoretical and practical knowledge that makes students sophisticated consumers and good practitioners of econometrics in the world of business. Topics covered are the multiple-regression-model theory of estimation and prediction, diagnosis, and the complications encountered most often, such as outliers, heteroskedasticity, multicollinearity, lagged dependent variables, simultaneity, and truncated variables. Principal component analysis and probit/logit analysis, often used in business, are also covered. Heavy emphasis is placed on the analysis of datasets from the fields of business and economics. Computer packages are used throughout the course. The students must be comfortable in quantitative thinking and computer environments.

NBA 644 Quality Management
Fall. 3 credits. Prerequisite: NCC 508 or permission of the instructor. J. Robinson.
The course uses the Malcolm Baldrige National Quality Award Criteria to examine issues in managing quality in both service and manufacturing environments. Topics include an external focus on identifying and satisfying the customer; an internal focus on process redesign and improvement (including bottleneck management and the just-in-time philosophy of eliminating waste); the strategic and competitive aspects of quality improvement; human-resource issues (such as worker participation, motivation and performance measurement, and worker teams); quality and design, and selected topics in statistical quality control (experimental design, acceptance sampling, and so on). Students should have a working knowledge of Lotus 1-2-3 or Excel software.

NBA 649 International Operations Management
Fall. 3 credits. Prerequisite: NCC 508 (Production & Operations Core). K. Malik.
The course examines issues in five areas: international operations strategy (globalization of operations, structure of international operations, and global strategies); global comparison of operations (comparative study of environment and operational practices in various countries and regions, including discussions on international diversity, varying political systems, and governmental issues); issues critical to global operations (international operations planning, facilities location, global logistics, aggregate planning across national borders, global sourcing and technology transfer); and R and D (currency risk, and capital budgeting); operations issues affected by globalization (lead-time, just-in-time, and cost issues, including accounting practices); and international cross-functional coordination (product development in an international context, workforce management, interface with marketing, and finance). The course uses directed readings and case discussions.

NBA 650 Semester in Manufacturing Management (also OR/IE 567 and ILR 675)
Spring. 15 credits. Enrollment limited; permission of instructor required. R. Conway, R. Matthews, T. Hammer.
This is a full-time program for the semester, students will not be able to take other courses concurrently. Students will be familiar with the integrated model with the introduction of technological, human-resource, logistical, and financial considerations to produce a manufacturing enterprise that can respond quickly and effectively to market conditions. Students will learn how to meet the increasingly complex requirements of the modern marketplace, and much of the student work will be team-oriented. There will be considerable off-campus travel for field study of a variety of manufacturing plants. Note that the course is an approved substitute for both the Production and Operations Management and Organizational Behavior core courses, i.e., NCC 504 and NCC 508. Johnson School students should complete NCC 508 before taking this course.

Behavioral and Organizational Science

NBA 663 Managerial Decision Making
Fall, spring. 3 credits. D. Sally, J. Russo.
All managers make decisions, usually without the aid of formal research. Much research has shown that such intuitive decisions produce common, predictable errors. The course uses the psychology of decision making to teach managers how to recognize the situations that most commonly lead to error and offers methods to overcome such errors. Specific applications include forecasting, pricing and promotion strategies, negotiations, the psychology of financial markets, and managerial risk taking.

NBA 665 Managing Technology and Innovation
Fall. 3 credits. H. Haveman.
This course is designed for students who see themselves in settings where they have to develop new products or processes and for students who must implement change in existing products or processes. We discuss major issues involved in managing the introduction of new technology, including competitiveness, technology assessment, R&D strategy, and positioning. We examine how industries are transformed by new technologies and how innovations diffuse among firms. We also consider internal management issues, including such topics as the structure of innovative organizations, the design of incentive and reward systems that foster risk taking, the way innovation champions manage the new-product development through cross-functional teams, and the role of executive leadership. The course uses a combination of readings, lectures, discussions, case analyses, and group projects to develop this knowledge. Two case analyses will be prepared by students working in groups. These serve as preparation for the final project, which requires students to study a product or process innovation in a firm. Class participation requires thoughtful discussion of the materials assigned each week.

NBA 666 Negotiations
Fall, spring. 3 credits. V. Medvec.
Negotiation is the art and science of securing agreements between two or more interdependent parties. The purpose of this course is to understand the theory and processes of negotiation as it is practiced in a variety of settings. This course is designed to complement the technical and diagnostic skills learned in other courses at the Johnson School. A basic premise of the course is that while a manager needs analytical skills to develop optimal solutions to problems, a broad range of negotiation skills will be needed for these solutions to be accepted and implemented. The course will highlight the components of an effective negotiation and teach students to analyze their own behavior in negotiations. The course will be largely experiential, providing students with an opportunity to develop their skills by participating in negotiations and integrating their experiences with the principles and tools presented in the assigned readings and course discussions.

NBA 670 Strategic Management of Human Assets
Not offered in 1995–96. 3 credits. Prerequisite: NCC 504 or permission of the instructor. P. Sherer.
This course builds on the growing awareness among academics, consultants, corporate planners, and senior executives that the management of people as human assets plays an important role in the production of firm capabilities and is the untapped arena for gaining competitive advantage. The course builds on this awareness by drawing from topics in the fields of human resource management, organizational design, and the resource-based approach in business strategy. The topics are both theoretical and practical and the course takes a "macro" or firm-level perspective. Cases will be used extensively throughout the course.

NMI AND NRE RESEARCH AND ADVANCED STUDIES

NMI 500–502 Directed Reading and Research
Fall, spring. 1, 2, or 3 credits. S-U grading only. Students undertake special-interest research under the supervision of faculty members. Registration is limited to students who have the approval of their adviser and of the faculty members involved.

NMI 510 Multi-Cultural Work Environments
Spring. 1 credit. S-U grading only. Restricted to Johnson School students. C. Rosen, B. Mink.
NRE 510 is a 1-credit, S/U, independent study course that is open to students whose summer internships will be in a country other than that of their citizenship or prior work experience. The goal of the course is to promote an understanding of cultural assumptions we bring to the work environment and the effects of cultural differences on organizational interactions and productivity. Registration for the course occurs in the spring semester prior to the internship, and grades are posted in the following fall semester after completion of the course project (a 10-page paper). Students may register for the course after obtaining an internship offer and completing the paperwork for the course instructors. International students will obtain and process work authorization forms with the International Students Office. See Charlotte Rosen (Malott 558) for further details about the academic and immigration requirements for NMI 510.

DOCTORAL SEMINARS

NRE 502 Doctoral Seminar in Marketing
Spring. 3 credits. Staff.

NRE 504 Doctoral Seminar in Accounting
Spring. 3 credits. Staff.
The seminar provides a rigorous and integrative exposure to those aspects of the literature in accounting, behavioral economics, and psychology that are related to questions of accounting and auditing theory and research. This course is for Ph.D. students only.

NRE 507 Doctoral Seminar: Affect And Cognition
Not offered in 1995–96. 3 credits. A. Isen.
The course examines research on some of the ways affect influences such thought processes as memory, decision making (including risk taking), and problem solving (including creative problem solving). Applied topics relevant to management concerns (for example, organizational behavior and consumer behavior) as well as other theoretical and applied topics (among them medical decision making, social interaction, self-concept, and cognitive and affective development) are considered, depending on student interests. Courses in statistics and experimental design.

NRE 509 Doctoral Seminar in Research Methods
Fall. 3 credits. H. Haveman.
This course concerns the fundamentals of scientific research: theory, research design, methods, and criticism. It is designed for doctoral students who wish to undertake research publishable in scholarly journals. Little or no scientific training is assumed. Statistics will not be emphasized; however, familiarity with elementary statistical concepts and inference will prove useful. The course will cover: 1) the principles of theory building; 2) the pros and cons of various general research designs (laboratory and field experiments, surveys, interviews, participant observation, archival studies, simulations, and formal (math); and 3) the structure of research papers and the review process.

NRE 511 Doctoral Seminar in Finance—Corporate Finance
Fall, first half of semester. 1.5 credits. R. Michaela.
This course will cover topics in corporate finance and empirical asset pricing.

NRE 513 Doctoral Seminar in Finance—Market Microstructure
Not offered in 1995–96. 3 credits. M. O'Hara.
The course examines recent research in market microstructure, particularly as it relates to theoretical models of asset prices constructed in the absence of arbitrage. The method of instruction is primarily presentations given by the students on important papers. The presentation and the final exam each comprise about half the grade.

NRE 514 Doctoral Seminar in Finance—Asset Pricing Theory
Fall, second half of semester. 1.5 credits. Permission of instructor required. P. Carr.
The course will cover asset pricing theory as based on either economic equilibrium or the absence of arbitrage. The method of instruction is primarily presentations given by the students on important papers. The presentation and the final exam each comprise about half the grade.

NRE 517 Doctoral Seminar in Information, Incentives, Games, and Contracts.
An introduction to game theory and information economics for a broad audience — those who will construct (or just consume) game-theoretic models in applied fields of management (including accounting, finance, marketing, and organizational behavior) and applied fields of economics (including industrial organization, labor economics, macroeconomics, and international economics). The course emphasizes applications at least as much as pure theory: each step in the theory is illustrated by applications from management and economics before the next step in the theory is introduced. The wide variety of applications shows that similar issues arise in different fields and that the same game-theoretic tools can be applied in each setting.

NRE 519 Doctoral Seminar in Finance—Derivative Securities
Not offered in 1995–96. 1.5 credits. P. Carr.
This course will cover advanced topics in derivative securities. Techniques for dealing with the valuation and hedging of exotic options will be covered. The method of instruction is primarily presentations given by the students on important papers. The presentation and the final exam each comprise about half the grade.

FACULTY ROSTER
Ben-Daniel, David J., Ph.D. Massachusetts Inst. of Technology. Don and Margi Berens Professor of Entrepreneurship
Bierman, Harold, Jr., Ph.D., U. of Michigan.
Nicholas H. Noyes Professor of Business Administration
Bloomfield, Robert J., Ph.D., U. of Michigan. Asst. Prof., Accounting
Carr, Peter P., Ph.D., U. of California at Los Angeles. Asst. Prof., Finance
Conway, Richard W., Ph.D., Cornell U.
Emerson Electric Co. Professor of Manufacturing, Prof., Information Systems
D'Souza, Julia, Ph.D., Northwestern U. Asst.
Dyckman, Thomas R., Ph.D., U. of Michigan.
Ann Whitney Olin Professor of Accounting
Elliott, John A., Ph.D., Cornell U. Assoc. Prof., Accounting
Frank, Robert, Ph.D., U. of California at Berkeley. Goldwin Smith Professor of Economics, Ethics, and Public Policy
Gibbons, Robert S., Ph.D. Stanford U. Assoc. Prof., Economics
Hass, Jerome E., Ph.D., Carnegie-Mellon U. Prof., Finance and Business Strategy
Haveman, Heather A., Ph.D., U. of California at Berkeley. Assoc. Prof., Organizational Behavior
Hilton, Ronald W., Ph.D., Ohio State U. Prof., Accounting
Iser, Alice M., Ph.D., Stanford U. C. Johnson Professor of Marketing, Prof., Organizational Behavior, Prof., Psychology
Jaquier, Eric, Ph.D., U. of Chicago. Asst. Prof., Finance
Jarrow, Robert A., Ph.D., Massachusetts Inst. of Technology. Ronald P. and Susan E. Lynch Professor of Investment Management, Prof., Finance and Economics
Kadiyali, Vinita, Ph.D., Northwestern U. Acting Asst. Prof., Marketing and Economics
Libby, Robert, Ph.D., U. of Illinois.
David A. Thomas Professor of Management, Prof., Accounting, and Behavioral Science
Lind, Robert C., Ph.D., Stanford U. Prof., Economics, Management, and Public Policy
McAdams, Alan K., Ph.D., Stanford U. Assoc. Prof., Managerial Economics
McClain, John O., Ph.D., Yale U. Prof., Quantitative Analysis
Malik, Kavindra, Ph.D., U. of Pennsylvania. Asst. Prof., Operations Management
Medvec, Victoria H., Ph.D., Cornell U. Asst. Prof., Organizational Behavior
Merton, Alan G., Ph.D., U. of Wisconsin.
Anne and Elmer Lindseth Dean of the S.C. Johnson Graduate School of Management, Prof., Information Systems
Michaley, Roni, Ph.D., New York U. Asst. Prof., Finance
Nelson, Mark W., Ph.D., Ohio State U. Asst. Prof., Accounting
O'Hara, Maureen, Ph.D., Northwestern U. Robert W. Purcell Professor of Management
Ormian, Levent V., Ph.D., Northwestern U. Assoc. Prof., Information Systems
Deane W. Malott Professor of Management, Prof., Marketing and Quantitative Methods
Robinson, Lawrence W., Ph.D., U. of Chicago. Asst. Prof., Operations Management
Russo, J. Edward, Ph.D., U. of Michigan. Prof., Marketing and Behavioral Science
Sally, David F., Ph.D., U. of Chicago. Asst. Prof., Organizational Behavior
Smidt, Seymour, Ph.D., U. of Chicago.
Nicholas H. Noyes Professor of Economics and Finance
Stevanov, David M., Ph.D., U. of California at Berkeley. Asst. Prof., Marketing
Swaminathan, Bhaskaran, Ph.D., U. of California at Los Angeles. Asst. Prof., Finance
Thomas, L. Joseph, Ph.D., Yale U. Nicholas H. Noyes Professor of Manufacturing
Waldman, Michael, Ph.D., U. of Pennsylvania. Prof., Economics

COURSES 293
Wittink, Dick R., Ph.D., Purdue U. Prof., Marketing and Quantitative Methods

**Lecturers**
- Katz, Jan, Ph.D., Massachusetts Inst. of Technology. Lec., International Business and Marketing
- Matthews, Ronald W., Sr. Lec., Manufacturing Management
- Mink, Barbara E., M.A., Cornell U. Lec., Management Communication
- Pike, Alan S., M.A., Cornell U. Sr. Lec., Management Communication
- Rosen, Charlotte, Ph.D., Cornell U. Sr. Lec., Coordinator, Management Communication

**Adjunct and Visiting Faculty**
- Abowd, John M., Ph.D., U. of Chicago. Prof., Labor Economics
- Grossman, Dale A., J.D., American U. Sr. Lec., Tax and Business Law
- Jones, Sidney L. Ph.D., Stanford U. Prof., Management
- Schuler, Richard E., Ph.D., Brown U. Prof., Economics, Prof. Civil & Environmental Engineering
- Sherer, Peter D., Ph.D., U. of Wisconsin-Madison. Assoc. Prof., Management
- Stark, David, Ph.D., Northwestern U. Assoc. Prof., Sociology
- Wright, William F., Ph.D., U. of California at Berkeley. Prof., Accounting
DIVISION OF NUTRITIONAL SCIENCES

ADMINISTRATION
Cuberto Garza, director
Carole Bisogni, associate director for academic affairs
Kathleen Rasmussen, graduate faculty representative, Field of Nutrition

THE DIVISION
Nutritional sciences draws upon the chemical, biological, and social sciences to understand the complex relationships among human health, nutritional status, food and lifestyle patterns, and social and institutional environments. Understanding these relationships includes the study of the metabolic regulation and function of nutrients, nutrient requirements, and the role of diet in reducing risk of chronic disease, nutritional quality of foods, and interventions and policies designed to promote nutritional health of individuals and populations.

The focus of this broad field of study at Cornell is the Division of Nutritional Sciences, which brings together specialists from many disciplines. The faculty are involved in undergraduate and graduate teaching, research, and extension of research-based knowledge throughout New York State, the nation, and the world.

The division is affiliated with both the College of Human Ecology and the College of Agriculture and Life Sciences. An undergraduate program in nutritional sciences is offered through the College of Human Ecology, and an undergraduate program, Nutrition, Food, and Agriculture, is offered in the College of Agriculture and Life Sciences. Graduate study is administered through the Field of Nutrition, which includes faculty members throughout the university.

FACILITIES
Most of the faculty members of the division work in Savage Hall and Martha Van Rensselaer Hall. In addition to housing offices, classrooms, and seminar rooms, those buildings contain research facilities, specialized laboratories, a human metabolic research unit, and computer facilities.

The division's Learning Resources Center in Martha Van Rensselaer Hall is used by students for individual study and small group discussions. The Learning Resources Center contains class materials, audiovisual aids, and supplementary books and periodicals for independent study and special projects in nutrition. Savage Hall also has a graduate reading room.

UNDERGRADUATE PROGRAMS
The B.S. degree programs provide students with strong training in chemistry and biology and a strong foundation in the broad field of nutritional sciences. Through the nutritional sciences major in the College of Human Ecology, students can prepare for a variety of career interests including medicine and other health careers, fitness and sports nutrition, clinical nutrition, dietetics, nutritional biochemistry, and nutrition education. The undergraduate program, Nutrition, Food and Agriculture, in the College of Agriculture and Life Sciences is for students who desire strong training in human nutrition in combination with supportive course work in agriculture and the life sciences. Students in the Nutrition, Food, and Agriculture program supplement the core nutrition curriculum with courses in such areas as food science, animal science, food and agricultural economics, and advanced biology.

Every student majoring in nutrition is assigned a faculty adviser. An effort is made to match interests, and students may change advisers at any time if their goals and interests change. Regular student-adviser conferences are required at least twice a year. The adviser helps students select courses to meet their interests and college graduation requirements and often can suggest opportunities for individual study or experience outside the classroom.

THE CORE CURRICULUM
The core undergraduate curriculum includes introductory chemistry and biology, organic chemistry, biochemistry, physiology, and math as well as introductory courses in the social sciences. Students complete five core courses in nutritional sciences: Nutrition and Health: Concepts and Controversies, Social Science Perspectives on Food and Nutrition, Nutritional and Physicochemical Aspects of Foods, Physiological and Biochemical Bases of Nutrition, and Methods in Nutritional Sciences. Students select a minimum of three advanced courses in nutritional sciences in the area of their interest.

A strong foundation in chemistry and biology is required. New majors, including transfer students, should plan chemistry courses carefully to assure the appropriate sequence of courses. All students who have adequate preparation in high school mathematics and chemistry are encouraged to take Chemistry 207-208. For information about specific course requirements for the nutritional sciences major in the College of Human Ecology or the Nutrition, Food, and Agriculture program in the College of Agriculture and Life Sciences, contact the division's Academic Affairs Office, 309/335 MVR.

CAREER OPTIONS AND COURSE PLANNING
The core curriculum is viewed as the minimum requirements for a major in nutritional sciences. Students should consult with their advisers to develop course programs that will prepare them for entry-level jobs or graduate study in the field(s) of their particular interests. Independent study involving research or field study may be chosen to enhance a course program. A summary of suggested areas from which students can choose electives for different career interests follows.

Medicine and Other Health Careers: Students add physics and calculus to the core curriculum. Nutrition courses of special interest include those focused on the relationship of nutrition to disease, behavior, growth, development, and aging. Other electives may include genetics, advanced biology, sociology, psychology, humanities, public policy, and language.

Fitness and Sports Medicine: Students can complete the Applied Exercise Science Concentration at Ithaca College which includes courses in anatomy, kinesiology, exercise physiology, and biomechanics.

Nutrition courses of special interest relate to growth and development, regulation of body weight, and community nutrition and health. For information about the Applied Exercise Science Concentration, contact the Academic Affairs Office, 309 MVR.

Dietetics and Clinical Nutrition: Students can complete the academic requirements for the American Dietetic Association (ADA) by adding courses in foods, nutrition and disease, microbiology, management, statistics, and nutritional care to the core curriculum. For additional information about meeting ADA requirements see Gertrude Armbuster, 366 MVR.

Nutritional Biochemistry: Recommended electives include calculus, physics, genetics, advanced biology and chemistry, toxicology, and nutritional sciences courses related to the physiology, biochemistry, and metabolism of different nutrients and disease states.

Nutrition Communications and Community Nutrition: Suggested electives include courses in communications, education, human development, human service studies, public policy, and nutritional sciences courses related to community nutrition, maternal and child nutrition, geriatric nutrition, nutrition and disease, and food economics.

Consumer Foods: Recommended electives include courses in business, economics, communications, food science, microbiology, and nutritional sciences courses related to the physicochemical aspects of foods, management, and experimental foods.

Nutrition, Food and Agriculture: Recommended electives include food science, animal science, plant sciences, international agriculture, agricultural economics, biological sciences, and rural sociology.

International Nutrition: Recommended electives include courses in language, anthropology, agricultural economics, policy, economics, rural sociology, international
agriculture, and nutritional science courses related to maternal and child health and problems of developing nations.

FIELD EXPERIENCE
Structured field experience in a community agency, health-care facility, or business can be taken for credit in several ways through the Human Ecology Field and International Study Program or as an independent study course (NS 402).

INDEPENDENT STUDY ELECTIVES
Independent study courses (NS 400, 401, 402) can be used to obtain credit for more diverse or intensive experience than the classroom can offer, whether this involves laboratory work, library research, or field study. Any student interested in independent study should obtain the sponsorship of a faculty adviser and the approval of Carole Bisogni or consider applying to the honors program.

HONORS PROGRAM
The honors program, leading to a B.S. degree with honors in nutritional sciences, gives official recognition to students who have demonstrated excellence in their academic work and their capacity for independent study.

In addition to fulfilling the requirements for a major, students in the honors program take courses on designing and evaluating research, complete an original piece of research, and prepare an honors thesis. The honors project can offer, whether this involves laboratory work, library research, or field study. Animals may be used in some research studies.

For more information, students should contact Michael Kazarinoff, 230 Savage Hall.

COURSES RECOMMENDED FOR NONMAJORS
Courses in nutritional sciences can strengthen programs of study in biological sciences, biology and society, agriculture, food science, human development, human services, and other fields.

NS 115, Nutrition and Health: Concepts and Controversies, is open to all students. After NS 115, nonmajors with limited backgrounds in chemistry and biology may elect NS 222, Maternal and Child Nutrition; NS 247, Food for Contemporary Living; NS 262, The Cell and the External World; NS 275, Human Biology and Evolution; NS 276, Motivation; NS 306, Nutritional Problems of Developing Nations; NS 315, Obesity and the Regulation of Body Weight; NS 347, Human Growth and Development: Biological and Behavioral Interactions; NS 349, Geriatric Nutrition; NS 375 Developmental Psychobiology: Motivational Processes; NS 380, Integrating Food Systems and Human Nutrition Needs; NS 457, National and International Food Economics. Nonmajors with strong backgrounds in chemistry and the biological sciences may consider NS 331, Physiological and Biochemical Bases of Human Nutrition, as well as many advanced nutritional sciences courses, such as NS 421 Nutrition and Exercise; NS 441, Nutrition and Disease.

GRADUATE PROGRAMS
Graduate study is administered by the Field of Nutrition, a group of more than fifty faculty members from throughout the university who have a common interest in nutritional problems. In the M.S. and Ph.D. degree programs, students may specialize in animal nutrition, human nutrition, international nutrition, nutritional biochemistry, foods, or general nutrition. Research is emphasized in all graduate programs. Field experience may be a component of concentrations in community, international and public-health nutrition, and nutrition education.

The specialties and interests represented by faculty in the Field of Nutrition provide almost unlimited opportunity for graduate study. Cornell's extensive laboratory and agricultural facilities ensure that students interested in experimental nutrition have exceptional choice and thorough training. As the largest faculty in the country devoted to the study of human nutrition, the field includes specialists in biochemical, metabolic, epidemiological, and sociocultural research. Opportunities to work with community and federal agencies are available to students interested in applied nutrition and public policy, and students in international nutrition are expected to conduct their thesis research abroad.

For more information about the graduate program, interested persons may write for the brochure Graduate Study in Nutrition, available from the Graduate Faculty Representative, Field of Nutrition, Cornell University, MVR Hall, Ithaca, New York 14853-6301; telephone (607)255-4410.

COURSES

NS 115 Nutrition and Health: Concepts and Controversies

Facts and fallacies concerning the role that nutrition, exercise, and other health behaviors play in preventing disease, maintaining good health, and maximizing athletic performance will be discussed. Emphasis is on understanding the biological mechanisms through which good nutrition and regular exercise affect psychological and physical health.

NS 116 Personalized Health and Nutrition
Fall. 1 credit. Corequisite: NS 115. S-U only. Limited 10 per section. D. Levitsky. TBA.

This course provides students enrolled in NS 115 individualized assistance in many skills used in NS 115 including using computers to analyze diets, using electronic mail, finding and using scientific references, and reviewing material presented in NS 115 lectures.

NS 120 Contemporary Perspectives in Nutrition

A series of presentations by experts from various areas of the field of nutrition involving consideration of the many types of activities of nutritionists in contemporary society, including the requisite knowledge areas and skills for those activities.

NS 222 Maternal and Child Nutrition
Spring. 3 credits. Prerequisites: NS 115 and a college biology course or permission of the instructor. S-U grades optional. Limited to 20 students. Preregistration is required in room 309 Martha Van Rensselaer Hall. C. Garza. M W F 1:25.

Involves the study of nutritional requirements in pregnancy, lactation, infancy, and childhood growth through adolescence. Topics include the relationship between maternal diet and pregnancy outcome; analysis of different methods of infant feeding; and nutritional status of pregnant women, children, and adolescents in the United States and in developing countries.

NS 245 Social Science Perspectives on Food and Nutrition
Fall. 3 credits. Prerequisite: NS 115. Limited to nutrition majors. Letter grade only. D. Sanjur, J. Sobal. T R 10:10–11:25. Theories, concepts, and methods from several social science disciplines will be applied to food and nutrition topics and issues. Emphasis will be placed on theories on the formation and modification of food habits, dietary methodologies, ethnicity and food habits, and educational programs in nutrition in both national and international contexts.

NS 247 Food for Contemporary Living
Fall and spring. 3 credits. Laboratory sections limited to 16 students. Laboratory preregistration during course preregistration required in 309 Martha Van Rensselaer Hall. Laboratory coat required. G. Armbruster. Fall lec, M 12:20, lab T R 10:10–12:40; spring lec T R 10:10–12:40 or T R 2:15–4:35.

Integrates emphasis of sound nutritional practice in the scientific concepts and techniques of food preparation. Priority will be given to factors that influence meal planning, selection, and preparation of food, such as resources available; ethnic, cultural, and behavioral considerations; food presentation; sensory quality evaluation. Safe food handling practices and storage procedures included.

NS 262 The Cell and the External World
Spring. 3 credits. Prerequisites: one semester of biology. N. Noy. M W F 9:05. The course will focus on the relationships of the cell with the environment. Examples from three general areas will be considered:
1. Mechanisms of uptake of nutrients by bacterial and mammalian cells.
2. Intracellular outcomes of nutritional stimuli: effects on metabolism and gene transcription, toxicity.

NS 275 Human Biology and Evolution (also Biological Sciences 275 and Anthropology 275)
Fall. S-U grades optional, with permission of either instructor. Offered alternate years. See BIO SCI 275 for course description.

NS 276 Motivation (also Psychology 276)
Spring. 3 credits. E. M. Blass. See PSYCH 276 for course description.
NS 300 Special Studies for Undergraduates
Fall or spring. Prerequisites: permission of instructor. S-U grades optional. DNS for S grades only.
Special arrangements to establish equivalency for courses not transferred from a previous major or institution. Students prepare a description of the study they want to undertake on a form available from the Student Services Office. The form, signed by both the instructor directing the study and the associate director for academic affairs, is filed at course registration or during the change-of-registration period.

NS 306 Nutritional Problems of Developing Nations
The course is designed for undergraduates interested in the nutritional problems of developing countries. Attention is given to the array of nutrition problems encountered, the causes of hunger and malnutrition, the epidemiology of the major nutritional problems afflicting poor nations, the function of specific nutrients, implications of these problems on individuals and societies, and the types of programs that can be implemented to improve health and nutrition.

NS 315 Obesity and the Regulation of Body Weight (also Psychology 613)
Spring. 3 credits. Prerequisites: NS 115, PSY 110. S-U grades optional. Offered alternate years. D. Levitsky. T R 1:30-3:30.
This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, genetics of obesity, role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.

NS 331 Physiological and Biochemical Bases of Human Nutrition
Spring. 3 credits. Prerequisites: Biological Sciences 330 or 331 or equivalent. S-U grades optional. M. Stipanuk, C. McCormick. M W F 10:10.
The biochemical and physiological bases for human nutritional requirements, including digestion and absorption, energy metabolism, food intake regulation, lipids, carbohydrates, protein and amino acids, minerals, vitamins, and relationship of nutrition to major chronic diseases.

NS 332 Methods in Nutritional Sciences
Fall and spring. 3 credits. Each section limited to 10 students. Prerequisites: NS 245, NS 345, NS 331 preferred or concurrent registration. Laboratory preregistration during course preregistration required in room 305 Martha Van Rensselaer Hall. One evening prelist to be scheduled. J. T. Brenna. F, Lec. M 12:20; lab M W 1:25-4:00 or T R 1:25-4:00. S. lec M 12:20; lab M W 1:25-4:00 or T R 8:15-10:45 or T 1:25-4:00.
Laboratory introduction to principles and analytical techniques of nutritional research. Emphasis is on analytical concepts and skills required to determine nutrient function and nutritional status of individuals. Topics include methods of nutrient, metabolite, and enzyme analysis in body fluids, and methods for assessing individual food intake and nutritional status.

NS 341 Human Anatomy and Physiology Lab
Fall. 2 credits. Letter grade only. Prerequisites: BIO AP 311; NS 115 recommended. Lec. 40. V. Utermohlen. Lec W 12:20, lab M or W 2:30-4:25. Special lab offering fall 1995: course will cover anatomy only; next offered spring 1997 for 4 credits with regular content. Introduction to human anatomy and physiology with particular emphasis on aspects of relevance to nutrition sciences and medicine. All major organ systems will be covered. Laboratories will emphasize location, recognition, and description of anatomical structures and testing of physiological function with an emphasis on tests of nutritional and medical relevance.

NS 345 Nutritional and Physicochemical Aspects of Food
Spring. 3 credits. Prerequisite: college course in organic chemistry or biochemistry. S-U grades optional. R. Parker, B. Lewis. T R 2:30-3:45.
A study of the nutritional, physical and chemical properties of foods including composition, food structure, enzymic and nonenzymic phenomena, and preservation/food preparation aspects. Issues related to food safety, regulation, and food composition data bases will also be discussed.

NS 347 Human Growth and Development: Biological and Behavioral Interactions (also Human Development and Family Studies 347 and Biology and Society 347)
Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent; Human Development and Family Studies 115 or Psychology 115 or equivalent. Offered alternate years. Not offered 1995-96.
This course is concerned with the interrelationships between physical and psychological growth and development in humans, particularly during infancy. Intrinsic and extrinsic causes of variations in growth, including various forms of stimulation, are considered. In addition, the consequences of early growth and development for current and subsequent behavioral, psychological, and physical development are examined. The interaction between physical and behavioral or psychological factors is emphasized throughout the course.

NS 349 Geriatric Nutrition
Fall. 3 credits. Prerequisite: NS 115. Division faculty. T R 2:30-3:45.
Aims of the course are to acquaint students with effects of aging on nutritional needs; to teach them methods of nutritional assessment that are appropriate for use with the elderly; and to give them information on nutritional interventions that have been shown to have positive effects on the nutritional and health status of older individuals.

NS 361 Biology of Normal and Abnormal Behavior
Fall. 3 credits. Prerequisites: Biological Sciences 110 or Psychology 110, or permission of the instructor. A fundamental knowledge of biology and psychology is essential. S-U grades optional. Limited to juniors and seniors. B. Strupp. M W F 9:05.
A critical evaluation of biological factors thought to influence behavior and/or cognitive functioning. Biological, psychological, and sociocultural influences will be integrated. Topics include nutrition and behavior, psychiatric disorders, developmental exposure to environmental toxins and drugs of abuse, and biopsychology of learning, memory, intelligence, and related cognitive disorders.

NS 375 Developmental Psychobiology: Motivational Processes (also Psychology 375)
Spring. 3 credits. E. Blass. See PSYCH 375 for course description.

NS 378 Food, Nutrition, and Service Management
Fall. 3 credits. Prerequisites: NS 115, NS 247 or permission of instructor. P. Tennant. T R 8:40-9:55.
The application of management principles and theory to foodservice operations and nutrition services is discussed. The systems concept of organization is used. Emphasis is placed on leadership development, decision making/problem solving as related to procurement, production, distribution, and quality assurance in food and nutrition services. Recipe and menu development projects show the interrelationships of nutrition, labor, equipment, and environmental concerns. Marketing strategies and implementation are discussed.

NS 380 Integrating Food Systems and Human Nutrition Needs
Fall. 3 credits. Prerequisites: NS 115 or Food 200 or An Sc. 100. Letter grade only. G. Combs. T R 8:40-9:55.
A student-centered course that employs case studies to address concepts linking human nutrition and health issues to those involving systems of food production and distribution. Student teams will review and existing technological options within food systems to address domestic or international human nutrition needs.

NS 398 Honors in Nutritional Sciences
Fall. 1 credit. Limited to students admitted to the division honors program. S-U grades only. M. Kazarinoff and division faculty. Offered fall or spring. Research design. Analysis of research papers on selected topics.

NS 400-401-402-403 Special Studies for Undergraduates
Fall or spring. Credits to be arranged. S-U grades optional. Division faculty.
For advanced independent study by an individual student or for study on an experimental basis with a group of students in a field of nutritional sciences not otherwise provided through course work in the division or elsewhere at the university. Students prepare a description of the study they want to undertake on a form to be signed by the instructor directing the study and the associate director for academic affairs. The form, available from the Student Services Office, is filed at course registration or within the change-of-registration period. To ensure review before the close of the course registration or change-of-registration period, students should submit the special studies form to the associate director for academic affairs as early as possible.

NS 400 Directed Readings
For study that predominantly involves library research and independent reading.

NS 401 Empirical Research
For study that predominantly involves data collection and analysis or laboratory or studio projects.
needed for special supplies/activities. P. Tennant. Lec M W 9:05; labs, M T W 1:30-6:00.

Students will gain experience in facility design, equipment selection, use, and care; job analysis and evaluation; human resources planning; management of financial resources; menu planning, recipe development, volume food production; computer-assisted management; emergency training; applied safety and sanitation standards and will develop other

skills required to operate/manage a foodservice program. The application of total quality management in food service operations and general facility management is stressed. Laboratories will be arranged through Cornell Dining.

NS 498 Honors in Nutritional Sciences

Spring. 1 credit. Limited to students admitted to the division honors program. Students may register in NS 499 concurrently. M. Kazarinoff and Division faculty. M T W 11-12.

Informal presentation and discussion of current topics in food and nutrition in which all members participate. Written reports on topics discussed may be requested. Delineation of honors research problems in consultation with faculty advisers.

NS 499 Honors Problem

Fall and spring. Credits to be arranged. Open only to students in the division honors program. M. Kazarinoff and Division faculty.

An independent literature, laboratory, or field investigation. Students should plan to spread the work over two semesters.

NS 600 Special Problems for Graduate Students

Fall or spring. Credit to be arranged. Limited to graduate students recommended by their chair and approved by the instructor in charge. S-U grades optional. Division faculty.

Emphasis on independent advanced work. Experience in research laboratories in the division may be arranged.

NS 601 Proteins and Amino Acids (also Animal Science 601)

Spring. 2 credits. Prerequisites: physiol­ogy, biochemistry, and nutrition, or permission of instructor. Letter grade only. Offered alternate years. R. E. Austrich. W F 12:20.

A course in amino acid and protein nutrition, with emphasis on the dynamic aspects of protein digestion, amino acid transport, and amino acid and nitrogen metabolism. Topics also will include nutritional interrelationships of amino acids, amino acid availability and requirements, and the roles of amino acids in selected physiological processes.

NS 602 Lipids

Fall. 2 credits. A. Bensadoun. T R 11:15.

Advanced course on biochemical, metabolic, and physiological aspects of lipids, more specifically lipid transport. Topics covered include lipid methodology, structure of plasma lipoproteins, molecular biology and cell biology of apolipoproteins, lipoprotein receptors, lipid transfer factors, lipolytic enzymes, and atherosclerosis.

NS 604 The Vitamins

Fall. 2 credits. G. Combs. T R 10:10.

Text-based discussion sessions on nutritional aspects of the vitamins, including recent developments in nutritional and biochemical interrelationships with other nutrients and metabolites.

NS 607 Nutrition as an Integrating Discipline: Concepts and Paradigms

Fall. 3 credits. Prerequisite: some prior coursework or experience in nutrition, permission of the instructor. M. Kazarinoff, J-P. Habicht, and Division faculty.

This course is intended for graduate majors and minors in nutritional sciences who have had prior undergraduate course work in nutrition. It will cover current nutritional issues from molecular biology to public policy, presenting concepts and paradigms using Vitamin A as an example. Emphasis will be placed on the integration of actual and conceptual information and the use of this information to solve nutritional problems.

NS 611 Molecular Toxicology (also Toxicology 611)

Fall and spring. 3 credits. Prerequisite: Toxicology 610 and a full-year 400-level course in biochemistry or equivalent. S-U grades optional. Batch TBA.


NS 612 Methods of Assessing Physical Growth in Children

Spring. 3 credits. Prerequisites: permission to graduate students and students who have permission of the instructor. A previous course in statistics required. S-U grades optional. J. Haas. Lec T 1:25; lab, R 1:25-4:25; disc T 2:15-3:05.

A laboratory course to train students in methods and techniques used to assess the physical growth and development of children. The methods explored are those applicable for field or community studies and cover anthropometry, body composition, skeletal age, maturity indicators, physical fitness, and energy expenditure.

NS 614 Topics in Maternal and Child Nutrition

Fall. 3 credits. Prerequisites: NS 331, and 222 or 347, Biological Sciences 311, and permission of instructor. K. Rasmussen. T R 8:30-9:55.

Advanced course on the role of nutrition during pregnancy and lactation. Feeding and growth of infants and children in health and disease is considered. Critical evaluation of current literature is emphasized via lecture, discussions, and a term paper.

NS 617 Teaching Seminar

Fall or spring. 0 credit. Limited to division graduate students and students who have permission of the instructor. S-U only. C. Bishop, D. Wo.

Individualized instruction focusing on development of teaching skills for guiding classroom learning in lecture, discussion, and laboratory settings. Preparation of content, presentation, and interaction techniques and evaluative methods are emphasized in relation to the student's specific teaching assignment. Videotape simulations provide opportunity for practice and analysis of teaching behaviors.
metabolic components support the structure through characterizations of how the metabolic components support the structure through characterizations of how the

The dynamics of energy metabolism in humans and higher animals are developed through characterizations of how the metabolic components support the structure through characterizations of how the metabolism are considered from both theoretical and practical aspects. The intracellular mechanisms of regulation are stressed, with specific examples examined in detail.

The goal of the course is to help students gain 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.

Field of Nutrition Seminar (also Animal Science 619)
Fall or spring. 0 credit. S–U only. Faculty and guest lecturers. M 4:00.
Lectures on current research in nutrition.

Food Carbohydrates (also Food Science 620)
Spring. 2 credits. Prerequisites: Biological Sciences 330 or equivalent. Letter grades only. Offered alternate years. J. Brady, B. Lewis. T R 10:10.
A consideration of the chemistry of carbohydrates, including sugars and complex carbohydrates (starches, pectins, hemicelluloses, gums, cellulose, and glycoconjugates). Emphasis is on intrinsic chemistry, functionality in food systems, and changes occurring during food processing and storage.

Special Topics in Food
Fall or spring. 2 credits. G. Ambroster, B. Lewis. TBA.
Current research related to food is reviewed in the context of basic principles and their application to the quality of food.

Dietary Assessment
Fall. 1 credit. 7 weeks only. Prerequisites: statistics and NS 331 or equivalent. Enrollment limited. Next offered 1996–97.
Study of methods and techniques for assessing dietary intakes at the individual and household levels.

Mechanisms of Metabolic Regulation (also Biological Sciences 625)
Spring. 2 credits. Prerequisites: Chemistry 358 or 360 and either Biological Sciences 330 or 331 or permission of instructor. Offered alternate years. Next offered 1997–98.
M. Kamaris. T R 9:05.
Lectures only. The identification and characterization of regulatory steps in metabolism are considered from both theoretical and practical aspects. The intracellular mechanisms of regulation are stressed, with specific examples examined in detail.

Integration and Coordination of Energy Metabolism (also Biological Sciences 627)
Fall. 3 credits. Prerequisites: Biological Sciences 330 and 331, or equivalent. M W F 9:05.
The dynamics of energy metabolism in humans and higher animals are developed through characterizations of how the metabolic components support the structure and function of the individual tissues. Mechanisms that control and coordinate energy metabolism within and between organs are analyzed in the context of selected physiological and pathological stresses.

Epidemiology of Nutrition
Spring. 3 credits. Limited to graduate students. Prerequisites: Statistics and Biometry 602 or 604 or equivalent, NS 331 or equivalent. J-P. Habicht. TBA.
Course covers principles of nutritional epidemiology, impact assessment of nutrition intervention programs, and nutritional surveillance. Teaching principles of using nutritional information for decision making, including the levels of evidence about nutrition and health for making decisions. The course shows how the chemistry and physiology of nutrition can be related to epidemiological assessment and research strategies.

Epidemiology of Nutrition Seminar
Spring. 3 credits. Reserved for graduate students planning field intervention studies, by permission of instructor.
Prerequisite: NS 637. J-P. Habicht. TBA.
Covers the meta-analysis, design, measurement, and analytic issues involved in developing, implementing, and analyzing studies of field interventions with nutritional impact.

Epidemiology Seminar (also Statistics and Biometry 639)
Spring. 0–1 credit. Limited to graduate students; others by permission of instructor. Contact P. Cassano 255-7551 for permission and credit information. S–U grades only. P. Cassano. M 12:20.
This course will develop skills in the preparation and interpretation of epidemiological data by discussing current research topics and issues.

Social Science Theories in Nutrition
Social science theories from psychology, sociology, anthropology, economics, political science, geography, and history that contribute to understanding food and nutrition will be examined. Examples of approaches, concepts, and methods from each discipline will be added to the student’s ability to apply social science theories to nutrition topics, issues, and problems.

Applied Regression Methods
Spring. 3 credits. Prerequisite: BTRY 601 or equivalent. E. Frongillo. M W F 11:15.
Second statistics course intended for graduate students who need to apply regression methodology in nutrition, health, human services, human development, program intervention, or related fields. The course covers the conceptual and statistical aspects of regression models for continuous, discrete, and time-to-event response variables with multiple covariates. Interpretation of parameters, confounding and interaction, and assessing fit are emphasized. An introduction to modeling complex observational data with multiple response variables is presented.

Community Nutrition Research Seminar
This seminar series focuses on research presentations in nutrition education and other areas of community nutrition. Cornell faculty and graduate students and outside invited speakers present research proposals, results from ongoing research, theoretical bases for research, program evaluations, and discuss current programs and issues in community nutrition research. The format varies but always includes discussion by participants.

Nutrition Intervention in Communities: A Global Perspective
Spring. 3 credits. Offered to 25 graduate students with an interest in human nutrition and health and exceptional senior nutrition majors by permission. Prerequisite: NS 640. Next offered 1996–97.
The goal of the course is to help students gain tools and develop conceptual frameworks for thinking critically about nutrition interventions in communities around the world. The course involves extensive reading and active involvement in class discussions.

Seminar: Physicochemical Aspects of Food
Spring. 1–3 credits. Prerequisite: a college course in organic chemistry or biochemistry. S–U grades optional. R. Parker, B. Lewis. T R 2:30–3:45.
An introduction to the physicochemical aspects of food, for graduate students who have had limited or no work in this area. The seminar uses the lectures of NS 345 as a basis for supplementary readings and critical review of research on selected topics.

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. J-P. Habicht. TBA.
Lectures cover social, environmental, and disease variables that influence the nutrition of infants, children, and adults. Students gain experience in nutritional assessment methods. Endemic nutritional problems (such as obesity, dental caries, and anemias) of public health importance of the United States are discussed.

Special Topics in Nutrition
Fall or spring. 3 credits maximum each term. Registration by permission of the instructor. Division faculty.
Designed for students who want to become informed in any special 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.

International Nutrition Problems, Policy and Programs
Fall. 3 credits. Prerequisite: permission of instructor. M. Latham. T R 11:15–12:30.
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.

Nutritional and Public Health Importance of Human Parasitic Infections
Fall. 2 credits. Prerequisites: graduate student status or permission of instructor. S–U grades optional. L. Stephenson. M 2:40–4:15.
Reviews the scientific evidence for relationships between human nutritional status and common human parasitic infections. Concentrates on malnutrition (protein-energy malnutrition) common to developing countries. Parastic infections emphasized are malaria, hookworm, ascasis, schistosomiasis, and trichuriasis. Format is lecture-discussion.

**NS 683 Field Studies in International/Community Nutrition**

Fall. 1 credit. Graduate student status or permission of instructor required. Strongly recommended for graduate students doing field research. S-U grades only. Mainly audio-tutorial format. L. Stephenson. TBA.

Requires practical considerations in conducting field research in developing countries, including (1) seeking fundings, (2) experimental design issues, (3) choice of procedures, and (4) planning for and carrying out data collection. Also includes how to a) construct a C.V., b) present an abstract and prepare a clear 10-minute talk with legible slides (FASEB formation), and c) when, where, and how to publish research results. Extensive handouts. Lecture/demonstration/discussion.

**NS 685 Food and Nutrition Policy (also Agricultural Economics 685)**

Spring. 3 credits. Prerequisites: introductory microeconomics, intermediate statistics (through multiple regression), or instructor's permission. D. Sahn, P. Dorosh. MW 2:30-3:45.

This course examines the role of government policy in alleviating poverty, food insecurity, and malnutrition in developing countries. Topics covered include methodologies for economic policy analysis of time use and food acquisition behavior, the "production" of nutritional outcomes, and the role of price policy and markets. Course readings draw largely on examples from Africa and Asia.

**NS 690 Trace Element and Isotopic Analysis (also Chemistry 628)**

Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390, or Grad Chem 584 and Physics 102 and Mathematics 112, or permission of instructor. S-U grades optional. Offered alternate years. J. T. Brenna. TR 10:10. See CHEM 628 for course description.

**NS 696 International Nutrition Seminar**


This seminar series consists of presentations by Cornell faculty and graduate students, and by outside invited speakers. Speakers cover a range of topics which relate to nutritional problems, policy, and programs in the non-industrialized countries.

**NS 699 Special Topics in International Nutrition**

Fall and spring. 3 credits maximum each term. Registration by permission of instructor. Faculty in Program in International Nutrition.

This option is designed for graduate students, mainly those with a concentration in international nutrition, who wish to become familiar with some specific topic related to international nutrition that is not adequately covered in an existing course. It consists usually of tutorial study on an agreed topic. Because the topics change, the course may be repeated for credit.

**NS 700 Current Topics in Toxicology (also Toxicology 698)**

Fall or spring. 1-3 credits. S-U grades optional. Staff. TBA.

A discussion of the most current developments in various areas of toxicological research and testing. Faculty and students will participate jointly in evaluating research findings and provide seminars and discussion of such material. For information regarding topic, instructor, and contact, see the University Guide of the Graduate Field of Environmental Toxicology.

**NS 702 Seminar in Toxicology (also Toxicology 702)**

Fall or spring. 1 credit. S-U grades only. Staff. F 12:20.

The seminar program covers varied topics in biochemical, genetic, nutritional, veterinary, and regulatory toxicology, ecotoxicology, and environmental chemistry. Included are presentations of basic research studies, fundamental concepts, and research activities involving environmental problems of a toxicological nature. Presentations are given by speakers from Cornell and visitors.

**NS 703 Seminar in Nutritional Science**

Fall and spring. 1 credit. S-U grades only. Division faculty. T 12:20 or W 12:20.

Presentation of original articles pertinent to the Nutritional Sciences. Students will learn how to make professional presentations and how to critique the presentations by others. In addition, students will learn how to read and interpret original published articles in a wide variety of journals.

**NS 707 Nutrition as an Integrating Discipline: Evaluation, Criticism, Application**

Fall. 3 credits. Prerequisites: advanced graduate standing and permission of the instructor. 2-hour class period per week plus discussion and workshop. Not offered 1995-96. M. Kazarinoff. K. Rasmussen.

The goal of this course is to provide an integrative course learning experience for advanced graduate students with majors in nutrition. Students will focus on a series of special problems in nutrition drawn from those currently faced by nutrition professionals. Special problems may involve assuming the role of consultants, expert committee members or peer-reviewers who are charged with answering questions or formulating recommendations related to research, programs, or policies.

**NS 899 Master's Thesis and Research**

Fall or spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional. Division graduate faculty.

**NS 999 Doctoral Thesis and Research**

Fall or spring. Credit to be arranged. Prerequisite: permission of the chair of the graduate committee and the instructor. S-U grades optional. Division graduate faculty.

**FACULTY ROSTER**

Aron, William J., Ph.D., U. of N. Dakota. Prof.
Bensdoun, Andre, Ph.D., Cornell U. Prof.
Bisogni, Carole, Ph.D., Cornell U. Assoc. Prof.
Brenna, Thomas, Ph.D., Cornell U. Asst. Prof.
Brook, Muncel M.S., Michigan State U. Prof.
Campbell, T. Colin, Ph.D., Cornell U. Jacob Gould Schurman Professor of Nutritional Biochemistry.
Chen, Junshi, M.D., Peking Medical College, China. Adjunct Prof.
Combs, Gerald F. Jr., Ph.D., Cornell U. Prof.
Devine, C., Ph.D., Cornell U. Asst. Prof.
Gorza, Cuberto, M.D., Baylor College, Ph.D., MIT. Director and Prof.
Gillespie, Ardhyn, Ph.D., Iowa State U. Assoc. Prof.
Hass, Jere D., Ph.D., Pennsylvania State U. Prof.
Habicht, Jean-Pierre, Ph.D., Massachusetts Inst. of Technology. James Jamison Professor of Nutritional Epidemiology.
Jonsson, Urban, Ph.D., Chalmers U. Tech. (Sweden). Adjunct Prof.
Kazarinoff, Michael N., Ph.D., Cornell U. Assoc Prof., Nutritional Sciences/Biochemistry.
Kazim, Cell, Ph.D., Cornell U. Assoc. Prof., Molecular and Cell Biology.
Levitsky, David A., Ph.D., Rutgers U. Prof.
Lewis, Bertha A., Ph.D., U. of Minnesota. Assoc Prof.
McCollom, Charles, Ph.D., North Carolina St. U. Assoc. Prof.
Nesheim, Mullen C., Ph.D., Cornell U. Prof.
Nye, Ni, Ph.D., Tel-Aviv U. (Israel). Assoc. Prof.
Olson, Christine M. Ph.D., U. of Wisconsin. Prof.
Parker, Robert S., Ph.D., Oregon State U. Assoc. Prof.
Pearson, Thomas, Ph.D., Johns Hopkins U. Adjunct Prof.
Rivera, Juan, Ph.D., Cornell U. Adjunct Asst. Prof.
Sahn, D., Ph.D., M.I.T. Assoc. Prof.
Sanjur, Diva M., Ph.D., Cornell U. Prof.
Sobal, Jeffery, Ph.D., U. of Pennsylvania. Assoc. Prof.
Stephenson, Lani, Ph.D., Cornell U. Assoc. Prof.
Stipanuk, Martha H., Ph.D., U. of Wisconsin. Prof.
Stover, Patrick, Ph.D., Med. College of Virginia. Asst. Prof.
Strupp, Barbara, Ph.D., Cornell U. Assoc. Prof.
Thobekane, Erik, Ph.D., U. of California. H. E. Babcock Professor of Economics and Food Economics.

**Other Teaching Personnel**

Brown, Edward, Jr., Ph.D., Cornell U. Senior Research Associate.

**Joint Appointees**

Appar, B. J., Visiting Assoc. Prof., U.S. Plant, Soil, and Nutrition Laboratory/Nutritional Sciences.
Bauman, Dale, Prof., Animal Science/Nutritional Sciences.
Blass, Elliot, Prof., Psychology/Nutritional Sciences.
Miller, Dennis, Prof., Food Science/Nutritional Sciences.
VanCampen, Darrell R., Assoc. Prof., U.S. Plant, Soil, and Nutrition Laboratory/Nutritional Sciences.
Military instruction began at Cornell University in 1868 under the provisions of the Morrill Act of 1862. Since that time, officer education has been highlighted by the construction of Barton Hall in 1914, establishment of a formal Reserve Officers Training Corps (ROTC) unit in 1917, and the evolution of a program that, while teaching drill and ceremonies, places greater emphasis on the development of leadership and managerial skills. Throughout the years, Cornell's program of officer education has produced many outstanding civilian and military leaders.

The programs of officer education allow the student to prepare for a commission as an officer in either the United States Army, Navy, Air Force, or Marine Corps. Each service program is headed by a senior military officer who also serves as a full professor on the Cornell faculty.

**MILITARY SCIENCE**

Lieutenant Colonel Michael Merola, Quartermaster Corps, United States Army, Professor of Military Science and Commanding Officer, U.S. Army ROTC Instructor Group

Major Jim S. Nuanez, Signal Corps, United States Army Reserve

Captain David G. Johnson, Field Artillery, United States Army

Captain John T. Hairs, Quartermaster Corps, United States Army

**United States Army ROTC Program**

The primary objective of the Army Officer Education Program at Cornell is to commission the future officer leadership of the United States Army. Intermediate objectives are to provide students with an understanding of the fundamentals of responsibility, integrity, and self-discipline, as well as an appreciation of the citizen's role in national defense. The application of the decision-making process to a variety of situations is given major emphasis as a valuable aid in developing leadership potential. These objectives are achieved through a program normally covering four years. A two-year program is available for those who qualify. The program includes specific courses in military science, more general academic subjects that assure a well-rounded education, practical training in leadership through participation in the Cadet Corps (including attendance at one six-week summer camp at an Army installation), and the opportunity to participate in a number of extracurricular activities. The combination prepares the student for commissioning and effective performance in the many branches of the Army. The student's academic major, academic performance, leadership ability, personal desires, and the needs of the Army determine the branch of the Army in which the student is commissioned upon graduation.

**Requirements for Enrolling**

Applicants must be citizens of the United States prior to being commissioned as lieutenants. (Noncitizens may enroll in selected portions of the program.) Students must meet Army medical requirements. Overall sound mental and physical condition is essential, and students are required to undergo periodic physical fitness tests. Enrollment and continuation in the program is subject to the approval of the professor of military science.

Enrollment in specific courses by students not formally enrolled in the program must be approved by course instructors.

Contracted students must register for letter-grade military science classes and leadership laboratories for the purpose of commissioning assessments into the United States Army.

**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 credits from secondary or military schools (Junior Division AROTC) may receive advanced standing.

Under the Four-Year Program students enroll in the Basic Course (Mil S I and II) during the first two years, and the Advanced Course (Mil S III and IV) during the next two years. A total of twelve credits of military subjects is taken. In addition, academic-enrichment courses are required in such fields as written communications, math logic, computer science, human behavior and military history. All cadets attend a six-week camp, with pay, between the junior and senior years. All cadets participate in physical fitness training three days per week. Each year cadets are sent to the Army's Airborne School, Winter Survival School, and Air Assault Course, dependent upon the number of school slots and the students' standings within the ROTC program.

**Basic Course (Mil S I and Mil S II)**

Students in the first year of the Basic Course take one classroom course in military science in the fall and spring semesters, for which they receive academic credit depending upon their college. These courses include study of the U.S. organization for defense and principles and techniques of leadership and management.

Students also participate in leadership modules that include rappelling, orienteering, drill and ceremony, physical training, winter survival, and individual tactical training. These modules are designed to promote personal development and enrichment. While they do not receive academic credit for these activities, students may receive physical education credit. Typical freshman participation in Army officer education is 48 1/2 hours.

**Advanced Course (Mil S III and Mil S IV)**

The Advanced Course of the Four-Year Program is open to students who have successfully completed the Basic Course and are accepted by the Professor of Military Science for further enrollment. It is also open to students who have gained appropriate advanced standing through either successful completion of a six-week summer camp or prior military training. Students entering the Advanced Course must have two years of academic work remaining at Cornell or another degree-granting institution. Students must pass required physical and aptitude tests. In addition, the past performance and desire of each student is evaluated to determine if he or she has the potential for eventual commissioning.

When students are accepted for the Advanced Course or accept a scholarship, they execute a written contract with the U.S. government. Under terms of the contract, they agree to complete the Advanced Course and to accept a commission if tendered. Concurrently with the signing of the contract, students enlist in the United States Army Reserve for control purposes.

Classroom study in the Advanced Course includes one military science course each semester on such subjects as leadership and management, small-unit tactics, and command and staff organization and functions. The two hours a week of practical leadership training continues, and between the junior and senior years all cadets attend a six-week advanced summer camp currently conducted at Fort Bragg, North Carolina.

**Scholarships**

Scholarships are awarded on the basis of merit and are available for two, three, or four years. AROTC scholarships are awarded each year to outstanding Basic Camp participants and students in the freshman and sophomore classes. Scholarships pay $5,000, $8,000, or $12,000 toward tuition and mandatory fees. Scholarship cadets and Advanced Course cadets also receive $150 a month for up to ten months a year. Scholarship cadets receive $450 per year to defray the cost of books and may be reimbursed up to $400 per year for lab fees.

**Commissioning**

All students who successfully complete the Advanced Course, including the advanced summer camp, are commissioned as second lieutenants in the United States Army Reserve or Regular Army upon graduation.
Service Obligations

ROTC graduates may serve on Active Duty, in the Army Reserve, or in the National Guard, depending upon the needs of the Army and the desires and leadership abilities of the cadet.

Officers beginning active duty attend the Officer Basic Course (normally ten to sixteen weeks) of their assigned branch. Upon completion of this course, officers are assigned to a unit and location that is determined by the desires of the individual and the requirements of the Army. Those officers selected for reserve duty attend the Officer Basic Course, after which they are released to reserve status.

Non-scholarship cadets accepting a Regular Army commission serve a minimum of three years on active duty followed by five years in reserve status. They may elect to go into the Army Reserve after commissioning as opposed to active duty.

Choice of Branch

Cadets in the second year of the Advanced Course (normally the senior year) may specify the branch of the Army—such as Infantry, Corps of Engineers, Quartermaster, Medical Science, Field Artillery, Signal Corps, Armor, Chemical, Aviation, Finance, Military Intelligence—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 deferrals, or educational delays, may be granted to individuals who want to attend graduate school at their own expense. Requests will be considered on the basis of needs of the service. Admission to graduate school is the student's responsibility.

Benefits

Each cadet in the Advanced Course (Mil S III and Mil S IV) receives $150 a month for up to ten months a year. While attending the advanced summer camp (between the junior and senior years), each cadet receives approximately $700 and an allowance for travel to and from camp. A cadet in the Two-Year Program receives the same payments as cadets in the Advanced Course and, in addition, receives approximately $700 and travel costs for summer Basic Camp attendance before entering the Advanced Course.

Military Science Courses

All cadets take one course and a leadership laboratory each semester in military science. The number of hours a week spent in the classroom varies from semester to semester, as does the credit received for each course.

Freshman Year (Mil S I)

Mil S 101 United States Organization for Defense
Fall. 1 credit. Required. Staff. Students examine the U.S. defense structure in terms of organization, mission, personnel and relationships among military forces and between the military forces and various branches and departments of the government. The United States Army force structure is examined at all levels. The complexities and magnitude of operating the defense organization are studied to provide a framework for subsequent instruction.

Mil S 102 Leadership Theory
Spring. 1 credit. Required. Staff. This course allows students to develop a basic understanding and appreciation of the theories of social and organizational psychology and behavior as they apply to the military setting. Attention is given to leader types, the source and exercise of authority, and the impact of varying styles of leadership on motivation and organizational effectiveness. The student is introduced to the concepts of integrity, ethics, and professionalism.

Sophomore Year (Mil S II)

Mil S 221 Mapping: Land Navigation
Fall. 1 credit. Required. Staff. This course provides practical knowledge of the various forms of topographic representation. Students interpret and use maps in terrain association and land navigation. Knowledge of topography is complemented by an orientation on significant environmental influences from physical, social, and climatic factors. Portions of the course offer practical experience in land navigation and orienteering.

Mil S 222 Small Organizational Operations
Spring. 1 credit. Required. Prerequisite: Mil S 102 or instructor approval. Staff. Students learn the basic principles of group dynamics at the level of the smallest military unit, the squad. Troop-leading procedures are introduced through case studies and role-playing exercises. Leadership theories introduced in Mil S 102 are examined in a variety of realistic settings. The practical application of behavioral theories is explored in the context of small military organizations.

Junior Year (Mil S III)

Mil S 331 Theory and Dynamics of the Military Team
Fall. 2 credits. Required. Staff. After an initial introduction to techniques of presenting basic material, students are provided with a broad understanding of the principles and application of teamwork in military organizations. Particular emphasis is given to leadership responsibilities of the commander as the team coordinator. Additionally, students have an opportunity to develop an understanding of the roles and contributions of the various branches of the Army in support of the military team.

Mil S 332 Leadership in Small-Unit Operations
Spring. 2 credits. Required. Prerequisite: Mil S 331. Staff. This course provides an understanding of the nature of decision making and the tactical application of the military team. Through the use of conferences and extensive practical exercises, students develop familiarity with the factors influencing a leader's decisions; the processes of planning, coordinating, and directing the operations of military units through operation plans and orders.

Senior Year (Mil S IV)

Mil S 441 Contemporary Military Environment I
Fall. 2 credits. Required. A continuation of Mil S 441. Students examine the leadership environment of the Army officer. Conferences and seminars examine the techniques of effective military leadership with special attention given to professionalism and ethical considerations in the armed forces during peacetime and armed conflict.

Mil S 442 Contemporary Military Environment II
Spring. 2 credits. Required. As with many laboratory periods, no credit is given, and participation is required for successful completion of the ARRO program. Students may receive physical education credit for the laboratory.

Each semester, cadets register for the appropriate leadership laboratory, consisting of physical fitness training three times per week, two days of military training each week, and one or two weekend training exercises per semester.

Mil S I Leadership Laboratory I
Fall. 0 credits. S/U. Required. S/U. Mil S 151
Spring. 0 credits. S/U. Required. S/U. Mil S 152
Mil S I cadets meet for two hours each week to learn a variety of military skills including rappelling, first aid, drill and ceremonies, military skiing, and weapons familiarization.

Mil S II Leadership Laboratory II
Fall. 0 credits. S/U. Required. S/U. Mil S 251
Spring. 0 credits. S/U. Required. S/U. Mil S 252
Mil S II Leadership Laboratory II
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, first aid, tactics and field exercises.

Mil S III Leadership Laboratory III
Fall. 0 credits. S/U. Required. S/U. Mil S 351
Spring. 0 credits. S/U. Required. S/U. Mil S 352
Cadets meet for two hours a week and some weekends to prepare for a six-week summer camp that follows the junior year. Emphasis is on the development of individual skills in leadership techniques and practical skills. Cadets rotate through leadership positions to develop an ability to apply decision-making processes to a myriad of situations. Cadets also acquire technical expertise and profi-
ciency in signal communications, physical fitness, drill and ceremonies, rappelling, orienteering, tactics, water survival, and other military skills.

**Mil S IV Leadership Laboratory IV**

Fall. 0 credits. Spring. 0 credits. S/U. Required. Required. S/U. Mil S 451 Mil S 452

Senior cadets plan and operate the leadership laboratory programs for Mil S I-III cadets. The development of planning and supervisory skills is emphasized. Cadets have an opportunity to practice leadership skills developed during previous ROTC training and summer camp experiences. This also includes two to three hours a week devoted to physical fitness.

**Mil S V Leadership Laboratory V**

Fall. 0 credits. Spring. 0 credits. S/U. Required. S/U. Mil S 551 Mil S 552

A continuation of Leadership Lab IV expressly for those cadets who need additional leadership skill development as determined by the Professor of Military Science. Enrollment is by instructor approval only.

**Professional Military Education (PME) Requirements**

In addition to the ROTC classes and leadership laboratories above, a number of courses are required as part of the contracted student’s academic program. These courses are offered by the university and round out the student’s professional education. The PME component of the ROTC program requires at least one college course in each of the following areas: human behavior, written communication skills, military history, math logic, and an introduction to computers. These courses must be completed prior to graduation and commissioning. Courses that meet these requirements are approved by the Professor of Military Science.

**NAVAL SCIENCE**

Captain M. Kehoe, United States Navy, Professor of Naval Science and Commanding Officer, Naval ROTC Unit

Commander L. Landis, United States Navy

Major S. W. Dowling, United States Marine Corps

Lieutenant C. D. Myers, United States Navy

Lieutenant J. A. DeSantis, United States Navy

Lieutenant J. J. Gordon, United States Navy

The objective of the Naval Officer Education Program is to prepare selected students for service as commissioned officers in the United States Navy or United States Marine Corps by supplementing their undergraduate education with instruction in essential concepts of naval science and fostering development in the qualities of leadership, integrity, and dedication to their country and the naval services. The program is compatible with most undergraduate major fields of study, including five-year baccalaureate degree programs on a case-by-case basis.

The objective is achieved through a broad program, normally covering four years, that combines specific courses in naval science and specified academic subjects to supplement weekly professional development sessions in which the practical aspects of naval science and leadership procedures are stressed. It also includes at least one summer-at-sea period.

Non-naval officer education students: Though the Navy-Marine Corps program has been designed to prepare future officers, naval science courses are open to all students at Cornell University as space limitations allow.

**Requirements for Enrollment**

An applicant for the Naval ROTC program at Cornell must be a citizen of the United States. Applicants must have reached their twentieth birthday by June 30 of the entering year and be less than thirty-five years of age on June 30 of the calendar year in which they are commissioned. Waivers of the upper age limit may be available for applicants who have prior active duty military service. Applicants must also meet physical and medical requirements. Interested students can visit the Naval ROTC Unit in Barton Hall or contact their local recruiter.

**Programs**

There are two programs: the Scholarship Program and the College Program. They differ primarily in benefits to the student.

**Scholarship Program**

The Scholarship Program provides approximately one thousand scholarships in more than sixty universities nationwide to selected students who want to serve in the Navy or Marine Corps. Financial support is provided students during college preceding the award of the baccalaureate degree.

**Benefits**

The program offers several different scholarships: two-, three- and four-year full tuition and benefits. While on scholarship, students also receive money for instructional fees, textbooks, nonconsumable supplies, and a $150-a-month stipend for a maximum of forty months.

Successful completion of the Scholarship Program leads to a commission in the Navy or Marine Corps Reserve. At Cornell University over 90 percent of NROTC students have a scholarship. Students entering NROTC without a scholarship are entitled to compete for two- or three-year scholarships controlled by the Chief of Naval Education and Training.

**Choosing a Scholarship Program**

There are three ways to enter the Scholarship Program:

First, by applying for the national competition each year. This process entails filling out and sending an appropriate application; being interviewed; having a physical examination; and applying to, and being accepted by, one of the colleges or universities throughout the country that offers an NROTC program.

Second, by enrolling in the College Program at Cornell and being recommended by the Professor of Naval Science for a scholarship after at least one semester in the program.

Third, by entering through the Two-Year Scholarship Program.

**College Program**

There are two College Programs available. Both lead to a commission in the Naval or Marine Corps Reserve and a minimum of three years of active duty.

Each of these programs provides textbooks for naval science courses, uniforms, and a subsistence allowance of $150 a month from the beginning of the junior year.

The regular College Program is four years long. Academic requirements for students in this program are somewhat less than those for scholarship students, as noted in the curriculum section of this booklet.

The Two-Year College Program begins the summer before the junior year, when students attend a required program with pay at the Naval Science Institute in Newport, Rhode Island.

**Summer Training**

Each summer, students in the Scholarship Program spend approximately four to six weeks on a Navy ship or with a naval activity anywhere in the world for on-the-job training. College Program students attend one summer training session of the same duration between the junior and senior years.

**Active Duty Requirements**

Scholarship midshipmen commissioned in the Navy or Marine Corps Reserve serve on active duty for a minimum of four years. College program midshipmen commissioned in the Naval or Marine Corps Reserve serve a minimum of three years on active duty. Specialized training such as aviation or nuclear power following commissioning adds additional active duty requirements in some cases.

**Choice of Assignment**

Graduates have an opportunity to request the duty they prefer upon graduation. These requests are given careful consideration, and every effort is made to assign the newly commissioned officer the duty of his or her choice. Among the types of assignments are duty in nuclear propulsion for surface ships and submarines, naval aviation, and conventionally powered surface ships. Other specialties may be available on a limited basis.

**Marine Corps Options**

The United States Marine Corps is an integral part of the Naval Services and is commanded by the Commandant of the Marine Corps. One-sixth of the NROTC scholarship students may be Marine selectees who will be designated Marine-option Midshipmen. Upon successful completion of the program they will be appointed second lieutenants in the United States Marine Corps Reserve.

Marine-option midshipmen follow the same program as other NROTC midshipmen for the first two years. Beginning with the junior year, Marine-option midshipmen are taught Marine oriented courses by a Marine Officer Instructor. For first class summer training (after the junior year), known as the USMC Officer Candidate School, Marine-option students travel to Quantico, Virginia, where they undergo six weeks of intensive training. Upon commissioning the following year as second lieutenants, they are 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, Engineering, Communications, Electronics, Supply, Administration, and Computer Science. The officer may serve on board naval vessels or at shore installations of the Marine Corps or Navy, in this country or overseas.

The Marine Corps has a postgraduate training system similar in objectives and organization to that of the Navy. Marine officers selected for aviation receive flight training at the Naval Air Station, Pensacola, Florida, along with their Navy counterparts.

**Curriculum**
A student has three categories of requirements to fulfill as a midshipman. The first of these requirements is a weekly naval professional development session each semester. The second requirement is a naval science course each semester. The last set of requirements consists of other required courses prescribed by the Navy to meet the growing need for more and better technically educated junior officers.

**Naval Professional Laboratories**
Nav S 141-142, 241-242, 341-342, or 441-442
All students in the program participate in one ninety-minute professional development session each week. The session is held from 2:30 until 4:00 on Wednesday afternoon. This period consists of both drill and professional information briefings. Students gain experience in actual leadership situations and at the same time learn the fundamentals of seamanship, military formations, movements, commands, discipline, courtesies, and honors. During information briefings special emphasis is given to applied leadership as it relates to the administrative and managerial aspects of a Navy or Marine Corps officer's duties.

**Naval Science Courses**
All Navy and Marine midshipmen take one naval science course each semester during their freshman and sophomore years. Navy-option students continue to take a naval science course each semester during their junior and senior years. Marine-option students are required to take the History of Amphibious Warfare and the Evolution of Warfare courses in either their junior or senior year, depending on when the courses are offered.

**Freshman Year (Navy and Marines)**
Nav S 101 Fundamentals of Naval Science
Fall. No credit.
A study of fundamental aspects of naval science, including its contributions to sea power, factors and different warfare communities involved in the physical development of naval forces, resources that must be managed, and prospects for the future. Naval uniforms, customs, and traditions are covered.

Nav S 102 Sea Power and Maritime Affairs
Spring. 2 credits.
Discussions examine the history of the Navy as a force in diplomacy and an instrument of U.S. foreign policy. Relationships between Congress and the military for determining the national defense policy are also explored. An integrated examination of current events and issues gives a historical perspective throughout the course.

Nav S 157 Principles of Sailing
Fall and spring. Physical education credit. Instruction in basic sailing skills and safety principles. Students sail small boats on Cayuga Lake, weather permitting. Focus is on U.S. Navy Class B inshore skipper certifications.

**Sophomore Year (Navy and Marines)**
Nav S 201 Organizational Behavior and Small Group Processes (also Hotel Administration 115)
Fall. 3 credits.
See description for Hotel Administration 115.
Nav S 202 Naval Ship Systems I (also Mechanical and Aerospace Engineering 101)
Spring. 3 credits. Two lecture classes each week.
An introduction to primary ship-systems and their interrelationship. Basic principles of thermodynamics, propulsion, mechanical operation, internal communications, electronics, ship structure, and other marine systems are considered.

Junior Year (Navy)
Nav S 301 Principles of Navigation (also Agricultural Engineering 305)
Fall 4 credits. Four classes each week (lecture-recitation-project work).
An introduction to the fundamentals of marine navigation emphasizing piloting and celestial navigation procedures. The course covers coordinate systems, chart projections, navigational aids, instruments, compass observations, time, star identification, use of the nautical almanac, tides and currents. Electronic navigation systems are also discussed.

Nav S 302 Naval Operations
Spring. 3 credits.
The course covers the application of the nautical rules of the road and maneuvering board in order to avoid collisions at sea. Other aspects of naval surface ship operations that are introduced include visual and electronic communications methods, tactical disposition of forces, ship handling theory, and deck scannanship topics.

Senior Year (Navy)
Nav S 401 Naval Ships Systems II (Weapons)
Fall. 3 credits.
The principles and theories used in the development of naval weapons systems are examined. Initially, extensive study is made of detection systems, especially radar and sonar, followed by discussions of ancillary systems for computing stabilizing, tracking, and weapons control and delivery.

Nav S 402 Leadership and Management II
Spring. Two credits.
A variety of topics important to the naval officer for both professional and managerial development are reviewed. The material is tailored for the midshipman to provide an understanding of naval administration and for use in the role of the division officer in counseling subordinates. Through the use of lectures, situation problems (case studies), and role playing, the student will learn various aspects of Navy management and administration.

Junior or Senior Year (Navy Options)
Nav S 310 Evolution of War
Fall. 3 credits.
A study of warfare that examines the relationship of military strategy to geography, economics, sociology, technology, and national political realities and values; the evolution of warfare, including principles of war, weapons, and associated equipment; and the effects of nuclear weapons and guerrilla warfare on traditional concepts of national strategy.

Nav S 410 History of Amphibious Warfare
Spring. 3 credits.
The history of the development, theory, techniques, and conduct of amphibious operations from 490 B.C. to the present. Special emphasis will be on amphibious operations conducted in the central Pacific during World War II and the future of amphibious operations.

**Other Required Courses**
**Naval Option Scholarship Program**
To be eligible for a commission in the United States Navy, midshipmen must successfully complete all the requirements for a baccalaureate degree in any field of study offered by Cornell University and complete courses in the following subjects (specified courses to be approved by the Professor of Naval Science):
- American military affairs or national security policy (one semester)
- English (one year)
- Calculus (one year)
- Calculus-based physics (one year)
- Computer science (one semester)

The calculus requirement must be satisfied by the end of the sophomore year and the physics requirement by the end of the junior year.

Although free choice of academic majors is permitted, students are encouraged to pursue majors in engineering and the physical sciences to meet the technological requirements of the modern Navy.

**Naval Option College Program**
Naval-option College Program students must complete one year of college-level study in mathematics, physical science, and English as a prerequisite for commissioning. The mathematics course must be completed by the end of the junior year, the physical science course by the end of the senior year. In addition, one term of computer science is required. College Program students who desire entry into the Naval-option Scholarship Program should fulfill all of the requirements applicable to Navy-option scholarship students to be eligible and competitive for a scholarship controlled by the Chief of Naval Education and Training.

**Marine Option**
Any midshipman, in either the Scholarship Program or the College Program, who
DEPARTMENT OF AEROSPACE STUDIES

Colonel James S. Seevers, United States Air Force, Professor of Aerospace Studies and Commander, Air Force ROTC Detachment 520

Captain David A. Levy, United States Air Force
Captain Troy D. Vokes, United States Air Force
Captain Scott L. Wilcox, United States Air Force

The objective of the Air Force officer education program at Cornell is to prepare men and women for positions as officers in the United States Air Force. The program is designed to teach students about the mission and organization of the Air Force, the historical development of airpower, and leadership management. Additionally, students study national security policy and formulation and the role of the military in a modern democratic society. The objectives are achieved through either a four-year or a two-year program. These programs include specific courses in aerospace studies and practical laboratories.

Requirements for Enrollment

The Air Force officer education program is open to any qualified 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.

Applications receive physical examinations at no cost and must meet certain physical requirements. Students who are interested in qualifying for flying categories (pilot or navigator) must meet more stringent physical requirements. In addition, students enrolled in the commissioning program must meet specified physical fitness requirements.

Though the program is designed to prepare future Air Force officers, Department of Aerospace Studies academic courses are open to all students at Cornell.

Four-Year Program

The Four-Year Program is open to all qualified freshmen. Sophomores may enter the program but require departmental approval. Students in a five-year degree program may enroll in their freshman, sophomore, or junior year.

Veterans of the U.S. armed forces and students entering Cornell from military schools may receive advanced standing, subject to approval by the Professor of Aerospace Studies.

The Four-Year Program consists of the General Military Course (GMC) and the Professional Officer Course (POC). For scholarship cadets, the first year of the GMC carries no military commitment, and students may withdraw at any time. For nonscholarship cadets, both years of the GMC carry no military commitment, and students may withdraw at any time.

General Military Course

Students in the General Military Course (GMC) take a one-credit Aerospace Studies course each semester. During the freshman year the student examines the organization and mission of the United States Air Force and the environment of the Air Force officer. In the sophomore year, the student studies the history and development of American air power. In both years, officership and professionalism within the United States Air Force are emphasized.

Students also spend two hours a week in a leadership laboratory. Leadership laboratory provides cadets with the opportunity to put into practice those skills they learn in their aerospace studies classes. These laboratories focus on the development of officer qualities through such activities as drill and ceremonies, group leadership problems, confidence-building exercises, and guest lecturers. 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 academic and physical standards. Each cadet accepted into the POC must sign an agreement to complete the program and accept, if tendered, a commission in the United States Air Force 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 military’s role in American society. Leadership laboratory requires 2 hours a week in the junior and senior years. In leadership laboratory, cadets are exposed to advanced leadership experiences and apply principles of leadership and management learned in the classroom.

Two-Year Program

The Two-Year Program consists of the last two years (Professional Officer Course) of the regular Four-Year Program plus a six-week summer training course preceding enrollment. (Details of the Professional Officer Course are given above.)

The Two-Year Program is open to all qualified students with two years of academic study remaining at Cornell (graduate or undergraduate) or at schools under crosstown agreement. Applications are accepted from October through April of the academic year preceding the applicant’s planned entry into the program. Selectees are then required to successfully complete a six-week summer training program at government expense.

Scholarships

The Air Force offers 4-year scholarships to high school seniors and 2- and 3-year scholarships to college students. Four-year scholarships are offered on a competitive basis in specified majors to high school...
seniors. Scholarship information can be obtained from a high school guidance counselor, from Air Force ROTC officers at a campus offering Air Force ROTC (Cornell AFROT/phone number is 607-255-4004), from a local Air Force recruiter, or from AFROT/ROR, Maxwell AFB, AL 36112-6663. The deadline for submitting a four-year scholarship application is December 1 of the year preceding the academic year in which a student wants to enter the program. Students should apply early.

Scholarships for 2 and 3 years. Applications for these scholarships should be made to the Professor of Aerospace Studies during the freshman or sophomore years of college. All selections are based on the student's major, scores achieved on the Air Force Officer Qualifying Test, the student's overall grade point average, and the recommendation of the Professor of Aerospace Studies. Scholarship amounts range from $2,000 per year to full tuition and provide a $150 monthly non-taxable allowance during the school year. In addition, scholarships pay for the cost of all required course textbooks and lab fees. Scholarships do not include the cost of room and board.

Benefits
All cadets in the advanced program (POC)—whether they are on scholarship or not—receive a $150-a-month, non-taxable subsistence allowance during the academic year. During the four- or six-week summer field training (see below), each cadet receives a pay allowance plus an allowance for travel to and from the field site. Textbooks and supplies required for Department of Aerospace Studies courses are provided.

All cadets are eligible to participate in AFROT-sponsord field trips made to Air Force bases throughout the country. Scholarship and advanced cadets (POC) are entitled to space-available travel on Air Force aircraft flying within the continental United States.

Field Training
There are two types of field training: a four-week course for cadets in the Four-Year Program and a six-week course for Two-Year Program applicants. Students in these programs normally attend field training during their sophomore and junior years. Field training is designed to stimulate the development of military leadership skills through meaningful experiences. The curriculum consists of aircraft, aircrew, and survival orientation; junior officer training; physical training; small arms training; a social-actions program; and supplemental training. The six-week training program includes sixty hours of Air Force ROTC academic course work and ten substantive subjects for the freshman and sophomore Aerospace Studies courses.

Between the junior and senior years, cadets may volunteer for one of many Advanced Training Programs. These programs include the Professional Development Program, Air Force Academy Free-Fall Parachute Training, the British Royal Air Force (RAF) Exchange Program, Research and Development Experiences, the Academy Soaring Program, and Academy Survival Training.

Commissioning Obligations
All students who successfully complete the AFROT advanced program (POC) and who are awarded a baccalaureate degree and are tendered a commission enter the Air Force as second lieutenants.

Second lieutenants commissioned in nonflying categories are required to serve on active duty for four years. Pilots are required to serve on active duty for eight years after completing flying training and receiving their aeronautical rating. Navigators serve six years after completing training.

Air Force Careers
Air Force policy has been to assign new officers to a career field appropriate to their educational background. Students in the engineering-scientific category may be assigned to practice in their specialty in research and development, communications, electronics, aeronautics, astronomy, the biological sciences, computer design and maintenance, meteorology, space, or various other engineering and scientific fields. Those graduating in the nontechnical category can anticipate assignments in manpower management, information management, logistics, law enforcement and investigation, intelligence, personnel, transportation, accounting and finance, and numerous other career fields. They may use their educational backgrounds in positions of responsibility and be given the opportunity to further their development in leadership and management skills.

Any undergraduate major is suitable for those who are qualified and interested in becoming pilots or navigators. After completion of flying training, rated personnel are assigned to a specific type of aircraft.

Curriculum
Students in the Four-Year Program are required to take all courses listed below. Students in the Two-Year Program are required to take all of the courses listed for the junior and senior years.

Freshman Year
Air S 161 Introduction to the Air Force Today
Fall. 1 credit.
An introductory study of the United States Air Force with an emphasis on officerhip and military-style communications.

Air S 162 United States Air Force Organization
Spring. 1 credit.
A study of U.S. Air Force leaders and organizations. Current factors affecting today's professional military officers are considered.

Sophomore Year
Air S 211 American Air Power
Fall. 3 credits.
The course studies the development of American air power. It concentrates on the evolution of thought on the proper way to employ air power to meet national security objectives. The course addresses the many factors that influenced air-power thinking. The course also emphasizes communication skills training and practical application.

Air S 212 Introduction to Leadership
Spring. 1 credit.
The course examines several topics that prepare cadets to succeed at field training. Subjects include effective communications, leadership, management, and problem-solving skills.

Junior Year
Air S 331 Air Force Leadership and Management
Fall. 3 credits.
This course is divided into three major parts. Part I is an introduction to effective written and oral communication skills. Communication skills are practiced and developed throughout the course. Part II focuses on leadership and management principles. The final part addresses ethics, values, and the standards of conduct expected of and practiced by military members. Student-run seminars, case studies, and oral and written assignments are required.

Air S 332 Management in the Armed Forces
Spring. 3 credits.
This course focuses on Total Quality Management (TQM) and its role in today's Air Force. Written and oral communication skills are emphasized throughout the course. Primary topics of discussion and analysis include the history and development of management thought, the fundamentals of TQM, TQM in the Air Force—Quality Air Force (QAF), and QAF application through real-world team problem solving. Student-run seminars, case studies, Quality Improvement Team participation, and oral and written assignments are required.

Senior Year
Air S 401 National Security Forces in Contemporary American Society I
Fall. 3 credits.
This is an advanced course on U.S. national security policy actors and processes, and current international politico-military issues affecting American security interests. Primary topics of discussion include the role of force in the nuclear age, Executive Branch national security decision-making, and specific issues such as low-intensity conflict, alliances, international forces and peacekeeping, arms control, and terrorism. Roles and missions of the U.S. Air Force in support of U.S. national security objectives are also examined.

Air S 402 National Security Forces in Contemporary American Society II
Spring. 3 credits.
This is a second-semester study of American national security policy, process, actors, and strategies. This course focuses on military law, officerhip, and Air Force issues and explores issues relevant to future Air Force officers. Throughout the course, writing and public speaking exercises are directed at improving students' communication skills.

Leadership Laboratory Courses
All Air Force cadets spend 2 hours a week throughout the academic year in a leadership laboratory, for which no academic credit is given. Occasionally laboratories are held at times other than the normally scheduled...
period. All cadets are expected to participate in an evening dining-in and to meet minimum physical fitness and weight standards each semester. Leadership lab is open to students qualified to compete for an Air Force commission.

**Air S 141-142 Initial Military Experiences**
Introduction to the responsibilities, life, and work of an Air Force officer. Basic knowledge of drill and ceremonies, military courtesies, and the wearing of the uniform. Field trip to a local military installation.

**Air S 241-242 Intermediate Military Experiences**
Develops skills in giving commands for drill and ceremonies. Introduction to the Air Force base environment in which the Air Force officer functions. Includes a look at career areas available based on academic majors. Students experience and participate in leadership situations through military drills and ceremonies. Field trip to a local military installation.

**Air S 341-342 Junior Officer Leadership**
Cadets assume leadership responsibilities similar to those of a junior officer. Emphasis is on comprehending the importance of applying effective human relations in dealing with superiors, peers, and subordinates. Cadets also gain insight into the general structure and progression patterns common to selected Air Force officer career fields.

**Air S 441 Advanced Leadership Experiences**
Command leadership in operating a military organization. Cadets apply effective leadership and managerial techniques with individuals and groups and participate in self-analysis of leadership and managerial abilities.

**Air S 442 Precommissioning Laboratory**
Factors that facilitate transition from civilian to military life are reviewed. The need for military security, base services and activities, personal finances, travel regulations, and social obligations are introduced.
ADMINISTRATION
Alan E. Gantert, director
George S. "Jack" Wright, assistant director

COURSES
The courses and fees described in this catalog are subject to change or cancellation at any time by official action of Cornell University. For current fee information on physical education courses, call 255-4286; for Outdoor Education courses, call 255-6415 (ext. 2). Enrollment in any course is limited by the space available. Other restrictions are included in the course description. Most courses are coeducational. The specific time and place of class meetings, as well as information about fees, are available at physical education course registration, as the curriculum is frequently changed.

Additional course offerings may be listed at registration, as the curriculum is frequently reviewed and changed.

Aquatic Courses

Lifeguard Training
Fall and spring. Fee charged. Prerequisites: swimming test consisting of 500 yards, demonstrating three strokes, treading water without the use of hands, and retrieving a brick from seven feet of water. Three classes a week.

An American Red Cross certification course. Practice and execution of lifeguarding first aid and CPR skills and techniques. Certification is awarded in lifeguarding, first aid, and CPR upon satisfactory completion of the course.

Lifeguard Training Instructor
Spring. Fee charged. Prerequisites: current Red Cross ICT or instructor card, written and skill tests in lifeguarding, first aid, and CPR techniques. Students must not miss first class. Two classes a week.

American Red Cross lifeguarding instructor and CPRFPR certifications are awarded upon successful completion.

Scuba, Open-Water
Fall, spring, and summer (6 weeks). Fee charged. Program includes classroom work skill training in a pool and open-water training in Cayuga Lake. P.A.D.I. open water certification awarded upon successful completion.

Scuba, Advanced Open-Water
Fall and spring. Fee charged. Advanced-level open-water training in Cayuga Lake. For those who have completed the open-water course.

Rescue Diver
Fall and spring. Fee charged. Advanced course for scuba divers. For those who have completed Advanced Open-Water Scuba certification and are interested in learning rescue and safety techniques.

Dive Master
Fall and spring. Fee charged. Advanced-level scuba course open only to those who have completed the Rescue Diver course. NOTE: This is a long, time-consuming course, which requires the student to be in good physical and swimming shape.

Specialty Scuba Diving
Fall and spring. Fee charged. Courses offered in the following specialty diving areas: navigation, search and recovery, night diving, deep diving, underwater photography, wreck, multi-level, boat, tropical fish identification and buoyancy control, and underwater naturalist.

Scuba Diving Trips
Fall and spring. Fee charged. This course is offered during intersession periods. Scuba trips to various destinations such as the Bahamas. Locations change from year to year. See the information sheet at the registration table.

Springboard Diving
Fall and spring. Instruction in the basic dives, including front (pike and layout), back, inward, reverse, and twisting dives.

Swimming, Introduction to
Fall, spring, and summer. (6 weeks). Instruction and practice in basic skills leading to passing the basic swimming proficiency test.

Swimming, Advanced Beginning
Fall and spring. This course is ideal for all who have taken one term of Beginning Swimming, regardless of whether the swimming test was successfully completed. Areas of special emphasis are the crawl stroke and rotary breathing, back crawl, elementary backstroke, diving, treading water, and underwater swimming. The primary objective of the advanced beginning course is to strengthen the students' confidence and competence.

Swimming, Intermediate
Fall and spring. Practice of basic skills and five basic strokes: front crawl, back crawl, elementary backstroke, breaststroke, sidestroke.

Swimming, Advanced
Fall and spring. Practice of nine strokes: front crawl, back crawl, elementary backstroke, breaststroke, inverted breaststroke, sidestroke, overarm sidestroke, trudgen, and butterfly.

Swimming Conditioning
Fall and spring. Prerequisite: good swimming ability. Introduction to, and practice of, different training methods. Final objective: to swim 2,500 yards during class period. Primarily a conditioning and not an instructional course.

Advanced Competitive Swim Conditioning
Fall. Prerequisites: a previous competitive swim experience and a previous aquatic conditioning class or permission of the instructor. This course is offered to those who have highly advanced swimming skills and are interested in competitive swim training.

Water Aerobics
Fall, spring, and summer (6 weeks). Water aerobics is a revitalizing way to get in shape and stay in shape. It offers the participant all of the components of a standard aerobics class in a refreshing aquatic environment: music, rhythmic routines, resistance activities, cardiovascular conditioning, stretching and flexibility. Water exercises have proven, over a extended period of time, to be as effective as the more traditional aerobics' programs but do not produce the injuries. It is the perfect way to exercise for old and young, fit and unfit, prenatal and new mothers, swimmers and non-swimmers.

Water Safety Instructor
Fall and spring. Fee charged. Introductory course for beginning water skiers. Conducted on the east shore of Cayuga Lake. Transportation and all equipment provided.

Water Safety Instructor Refresher Course
Spring. Selected sessions of the water safety instructor certification course.

Bowling Courses

Bowling
Fall and spring. Fee charged. For the beginning and intermediate bowler. Shoe rental is included in the fee.

Dance Courses

Develop flexibility, coordination, and the ability to perceive and reproduce phrases of dance movement with rhythmic accuracy, clarity of body design, and fullness of feeling. Auditions are required for admission to some advanced courses, since they require the mental and physical ability to perform more-complex phrases in various styles.

African Dance
Fall and spring.
Asian Dance (also Theater Arts 307)
Fall or spring.

Ballet I
Fall and spring.

Ballet II
Fall and spring.

Ballet III
Fall and spring.

Ballroom Dancing
Fall and spring and summer. Fee charged. One class a week, Helen Newman Hall. Students and their partners must sign up at one class registration.
Includes instruction in the waltz, swing, cha cha, cypso, tango, and others.

Belly Dancing
Fall and spring. Belly dancing is an exciting Middle Eastern folk art that can help in the development of flexibility, body awareness, and overall body tone. The class will begin with warm-ups and continue with basic movements and rhythms while putting them together in dance to music of the Middle East.

Contact Improvisation
Fall and spring.

Country Line Dancing
Fall and spring. No partners are needed. Most dances are done in parallel lines, with a few done in large circles. Once you learn a few basic steps, the possibilites are endless. Most dances have a fixed pattern and are simply different combinations of a few basic steps.

Exploration in Movement (A & B)
Fall and spring.

Jazz I
Fall and spring.

Jazz II
Fall and spring.

Modern Dance I (also Theater Arts 124)
Fall and spring.

Modern Dance II (also Theater Arts 232)
Fall, spring, and summer (6 weeks).

Modern Dance III (also Theater Arts 306)
Fall and spring.

Modern Dance IV (also Theater Arts 308)
Spring.

Tap Dance I
Fall.

Tap Dance II
Spring.

Equitation Courses
Basic, Intermediate, Advanced
Fall, spring, and summer (6 weeks). Fee charged.

Exercise-Fitness-Nutrition
Fall and spring.
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.

First Aid/CPR Courses
Community First Aid
Fall and spring. Fee charged.
This American Red Cross certification course includes adult, child, and infant CPR, as well as Standard First Aid. Standard First Aid is a basic-level first aid course accepted by most states for lifeguarding and other jobs that require first aid training. An optional upgrade to CPR for the Professional Rescuer will be offered for a small additional fee. This would be a typical certification for lifeguards, day camp counselors, and those with the responsibility of supervising children.

CPR for the Professional Rescuer
Fall and spring. No credit. Fee charged.
This is the highest level of cardiopulmonary resuscitation available. With the professional rescuer in mind, adult, child, infant, and two-rescuer CPR training is taught. Techniques necessary for use of barrier devices and bag-valve-masks are included. This course is recommended for coaches, teachers, and other supervisory professions.

Emergency Response
Fall and spring. Fee charged.
This advanced-level first aid course is the most comprehensive available without NYS certification. Sixty hours of training includes CPR for the Professional Rescuer and oxygen administration, as well as many of the first aid skills taught in a basic EMT class. American Red Cross certification is valid throughout the United States and is accepted by many states as a Certified First Responder equivalent. Certification is valid for three years. This certification would be appropriate for camp medical directors and those who work closely with pre-hospital medical staff.

First Aid, Responding to Emergencies
Fall and spring. Fee charged.
This course is designed for the student who would benefit from an increased level of first aid training. Adult CPR is included along with 20 hours of first aid training. American Red Cross certification is received in Adult CPR and Responding to Emergency First Aid. This increased first aid training is normally required for camp directors and supervisors.

NYS Emergency Medical Technician—Basic
Two-semester course. Fee charged.
This intensive 120-hour course is taught throughout both the fall and spring semesters. Course includes training in CPR for the Professional Rescuer, oxygen administration, airway management, fracture management, bleeding control, expanded patient assessment, spinal immobilization, medical anti-shock trousers, and defibrillation. Students will qualify for the NYS EMT Certification Exam upon successful completion of this course. Rigid attendance and participation requirements are strictly enforced.

Fitness Courses
Aerobic Dance
Fall, spring, and summer (6 weeks). Fee charged.
A simple dance program designed to keep the cardiovascular system in top shape by making the body demand increased amounts of oxygen.

Body Sculpting
Fall and spring.

Fitness and Conditioning
Fall and spring.
Physical fitness program that embodies features of stretching exercises, weight lifting, and jogging. Students work on their individual training needs.

Fitness for Women
Fall and spring.
Fitness program that is geared toward women's own interests and abilities. Nutrition, time management, relaxation techniques, and stress management are included.

Jogging
Fall and spring.
This course will cover correct running and stretching techniques. A conditioning program with the objective to develop the capacity to run three miles after 12 weeks of training.

Jogging Tours—Distance Running
Fall and spring.
A course designed for the Intermediate Runner who can run an average of 3 miles in 30 minutes. Most tours will be 3-4 miles long and will go through campus and nearby countryside.

Triathlon
Fall and spring. Fee charged.
Designed to acquaint students with the components of, and conditioning for, triathlon (running, swimming, and bicycling).

Wellness and Fitness
Fall and spring. Fee charged.
"Here's to a Healthier You" - A wellness experience for the busy student. This course will assess the student's physical fitness status, blood cholesterol levels, and overall lifestyle health habits. Each student will receive an individual exercise prescription and have access to the Wellness Program fitness room in Helen Newman Hall. Lectures on nutrition and stress management are also presented. This course has been made possible through the generosity of the Bateman family in memory of Ms. Dorothy Bateman, Cornell's first director of women's sports and physical education (1920 to 1962).

Golf Courses
Golf, Introduction to
Fall and spring. Fee charged.
A PGA program of instruction is geared to all levels of experience and ability. The objective is to give beginners enough skill to play, and to give more-advanced players direction in their thinking, practice, and play, through a thorough understanding of fundamentals. Equipment is furnished.

Golf, Recreational
Fall and spring. Limited to students who are experienced golfers. Fee charged.
Students must provide their own clubs. A minimum of ten rounds of nine holes each must be played to receive credit. Fee covers a semester's membership.
Gymnastics Courses

**Gymnastics, Introduction to**
Fall and spring.
Introduction to gymnastics deals with a majority of the Olympic events. The course will focus upon beginner-level skills ONLY and is open to both male and female participants.

**Gymnastics, Intermediate**
Fall and spring.
Prerequisite: Beginning gymnastics or interscholastic or collegiate team experience.

Ice Skating Courses

**Skating, Introduction to**
Fall and spring. Fee charged.
For beginners.

**Skating, Intermediate**
Fall and spring. Fee charged.
Limited to experienced skaters. Students provide their own skates or rent them at Lynah Rink.

**Figure Skating, Advanced**
Fall and spring. Fee charged.
Advanced figure skating techniques. Students provide their own figure skates or rent them at Lynah Rink.

**Figure Skating, Intermediate**
Fall and spring. Fee charged.
Limited to experienced skaters. Students provide their own figure skates or rent them at Lynah Rink.

Martial Arts—Self-Defense Courses

**Boxing, Introduction to**
Fall and spring.
The course covers the basic skills of footwork, defensive, and offensive techniques. Skipping rope, shadow boxing, and heavy bag work will be taught as methods for individual aerobic conditioning.

**Boxing, Thai**
Fall and spring. Fee charged.
A martial art system developed from the unique culture of Thailand is a blend of art, science, and sport.

**Fencing, Introduction to**
Fall and spring. Fee charged.
Includes warm-up exercises and all basic offensive and defensive moves. Equipment is furnished.

**Fencing, Intermediate**
Spring. Fee charged. Prerequisite: Introduction to Fencing or the equivalent. Interclass competition is stressed. Equipment is furnished.

**Judo, Introduction to**
Fall and spring. Fee charged.
Continue to develop skills in the two parts of judo: standing techniques (throws and trips) and mat techniques.

Judo, Intermediate
Fall and spring. Fee charged.
Continues to develop skills in the two parts of judo: standing techniques (throws and trips) and mat techniques.

Karate, Introduction to
Fall and spring. Fee charged.
A beginning course taught by professional black belt instructors. Involves mastery of basic blocks, kicks, and punches.

Karate, Advanced
Fall and spring. Fee charged.
Open to those who have taken Basic Karate or the equivalent.

**Kung Fu**
Fall and spring. Fee charged.
Exploration of conditioning and fitness procedures used in the major martial arts, such as karate or judo. Covers circular movement for generating strong blocks, kicks, and punches.

**Pa Tuan Chin**
Fall and spring.
Pa Tuan Chin (Eight Pieces of Brocade) is a type of exercise from China that develops strength and energy in the body. Movements, which are coordinated with special breathing patterns, are slow, smooth, and deliberate. Muscle excretion can vary depending upon the needs and lifestyle of the practitioner.

Self-Defense and Empowerment for Women
Fall and spring. Fee charged.
Basic methods of physical protection for women.

**Tae Kwon Do, Introduction to**
Fall and spring. Fee charged.
A Korean martial art distinguished by its emphasis on high and powerful kicks. Basic kicking, punching, and blocking are emphasized.

**Tae Kwon Do, Intermediate**
Fall and spring. Fee charged.
A Korean martial art distinguished by its emphasis on high and powerful kicks. Intermediate-level kicking, punching, and blocking are emphasized.

**Tae Kwon Do, Advanced**
Fall and spring. Fee charged.
A Korean martial art distinguished by its emphasis on high and powerful kicks. Advanced-level kicking, punching, and blocking are emphasized.

T'ai Chi Chuan, Introduction to, and Intermediate
Fall and spring.
Introduction to T'ai Chi, a system of graceful, slow-movement exercises that aim at nurturing relaxation, deep breathing, and improved circulation.

Outdoor Education Program
See the brochure for the Cornell University Outdoor Education Program at registration for more information about courses.

Climbing Courses

**Basic Rock-Climbing**
Fall, spring, and summer. Fee charged.
Seven afternoons climbing inside on the Lindseth climbing wall.

Advanced Rock-Climbing
Fall, spring. Fee charged.
Four evenings of advanced climbing techniques on the Lindseth climbing wall.

High Adventure 101
Fall, spring, and summer. Fee charged.
Six afternoons at local parks and wilderness areas, some classes on indoor Lindseth climbing wall.

Ice Climbing
Fall, spring. Fee charged.
Four outings to local state parks and gorges.

Southwest Backpacking
Fall, spring. Fee charged.
Classes lead to two full weekends on the trail.

Backpacking in the Finger Lakes
Fall, spring. Fee charged.
Spring break trip to the SW deserts and canyons.

Mountain Biking
Fall, spring. Fee charged.
Break trip explores the beauty of the Adirondacks via canoe.

Canoeing Courses

**Canoeing, Adirondacks**
Fall. Fee charged.
Break trip explores the beauty of the Adirondacks via canoe.
Canoeing, Flatwater  
Fall, spring. Fee charged.  
Four full days paddling local waterways.

Canoe/Camping, Flatwater  
Fall, spring. Fee charged.  
Four full days paddling local waterways including an overnight.

Canoeing, Moving  
Fall, spring. Fee charged.  
Includes a full weekend of river padding.

Caving Courses  
Caving  
Fall, spring. Fee charged.  
Four days in the fall and two weekends in the spring in Pennsylvania caves.

Fly Fishing Courses  
Fly Fishing  
Fall and spring. Fee charged.  
Introduction in fly casting skills and the art of tying artificial flies. Special Conditions: N.Y.S. fishing license required and each student must provide their own wader boots.

Hiking Courses  
Day Hiking  
Fall, spring. Fee charged.  
Day outings in the Finger Lakes Region.

Snowshoeing  
Spring. Fee charged.  
Day outings in the Finger Lakes Region.

Kayaking Courses  
Whitewater Kayaking  
Spring. Fee charged.  
Non-credit course. Day excursion for paddlers with basic skills.

White Water Kayaking  
Fall, spring. Fee charged.  
Includes a full weekend of whitewater paddling.

Pool Kayaking  
Fall, spring. Fee charged. Non-credit course.  
Introduction to whitewater kayaking skills.

Sea Kayaking  
Fall, spring. Fee charged.  
Break trip exploring various coastal areas.

Outdoor Leadership  
Wyoming Expedition  
Summer. Fee charged. Twenty-one day leadership and mountaineering expedition to the Wind River Mountains.

Outdoor Leadership  
Spring. Fee charged. Training course for outdoor education instructors.

Wilderness Emergency Care, Basic  
Fall, spring, summer. 6 weeks. Fee charged.  
Full weekend of wilderness first aid and CPR.

Wilderness Emergency Care, Advanced  
Fall, spring. Fee charged.  
Two evenings of specialized wilderness care.

Skiing—Cross-Country Courses  
Cross-Country Skiing, Basic  
Spring. Fee charged.

Cross-Country Skiing, Intermediate  
Spring. Fee charged.

Cross-Country Ski Day Touring  
Spring. Fee charged.  
Four full-day weekend outings. Emphasis on backwoods touring.

Telemark Skiing  
Spring. Fee charged.  
Four evenings of skiing at Song Mountain Ski Area.

Personal Growth Courses  
Alexander Technique  
Fall and spring. Fee charged.  
Exercise routines that increase sensory awareness.

Body-Mind  
Fall and spring. Activities in this course are drawn from ancient Eastern practices as well as modern Western psychology, and are designed to give the student first-hand experience of the interaction between their own bodies and minds.

Explorations in Meditation  
Fall and spring. This course provides the opportunity to explore a variety of ancient and modern methods designed to bring one to the state of meditation. The methods serve to evoke the deep relaxation from which heightened awareness and creativity arise.

Health Issues for Student Athletes  
Fall and spring. To promote and encourage lifestyle choices on the part of student athletes that will help them establish and maintain high levels of all-around health, and thereby contribute positively to their academic and athletic achievement. NOTE: This is an NCAA requirement open to sophomore athletes only.

Relaxation and Stress Management  
Fall and spring. Introduction to basic relaxation techniques for the reduction of everyday stress. Techniques will be taught that can be used in normal everyday living situations.

Swedish Massage  
Fall and spring. Fee charged.  
Learn to give a relaxing, stress-reducing Swedish massage. You will master the basic strokes of Swedish massage and learn about their application to the different parts of the body. Students will use oils and lotions as a part of their training.

Therapeutic Massage  
Fall and spring. Fee charged.  
This course will provide an experiential introduction to several types of massage. Included are Swedish, shiatsu, polarity, and sports massage. Class members will participate in group exercises and practice on each other during class time. All exercises and techniques can be done while wearing street clothing.

Yoga, Introduction to  
Fall, spring, and summer (6 weeks). Fee charged. Fundamentals of hatha-yoga. Covers basic postures, breathing techniques, and deep relaxation. Introduces chanting.

Yoga, Intermediate  
Fall and spring. Fee charged. One (1 1/2 hour) class a week, Helen Newman Hall. Designed for those who have completed Yoga I or its equivalent.

Racket Sports Courses  
Badminton, Introduction to  
Fall and spring. Helen Newman Hall. Fundamental shots, scoring, and general play.

Badminton, Intermediate  
Fall and spring. Helen Newman Hall. Review of fundamental shots, scoring, and general play.

Racquetball, Introduction to, Intermediate, and Advanced  
Fall, spring, and summer. Fee charged. Instruction at appropriate levels. Equipment is furnished. Protective eyewear required.

Racket Games  
Fall and spring. Racquetball, squash, badminton, tennis. Playing fundamentals, scoring, and rules are stressed. Interclass competition.

Squash, Introduction to, Intermediate and Advanced  
Fall, spring, and summer. Fee charged. Classes for appropriate level of play. Equipment is furnished. Protective eye wear required.

Tennis, Introduction to  
Fall and summer (outdoor). Spring (indoor—fee). Basic skills taught include forehand, backhand, serve, and volley. Scoring methods taught.

Tennis, Intermediate  
Fall and summer (outdoor). Spring (indoor—fee). Review basic strokes plus topspin and underspin. Doubles strategy emphasized.

Tennis, Advanced  
Fall (outdoor). Spring (indoor—fee). Advanced strokes taught and doubles play emphasized. Recommended for tournament players or those with previous team experience.

Tennis, Indoor-Recreational  
Spring (indoor—fee). Play is conducted at the new Reis Tennis Center. Players must have high school or college tournament experience or a rating of 4.0 or higher from the USTA. Matches are played in both doubles andingles. Equipment furnished. NO BLACK-SOLE SHOES ALLOWED ON COURTS!

Sailing Courses  
Board Sailing (Wind Surfing)  
Fall, spring, and summer (6 weeks). Fee charged. A Mistral Board Sailing Academy certificate is awarded on successful completion of the course.
Catamaran, Introduction to
Fall, spring, and summer (6 weeks). Fee charged. Learn unique skills necessary for sailing multi-hull catamarans.

Large-Boat Sailing, Introduction to
Fall, spring, and summer (6 weeks). Fee charged. Instruction in basic sailing skills and safety principles. Students sail small and large boats on Cayuga Lake, weather permitting.

Small-Boat Sailing, Introduction to
Fall, spring, and summer (6 weeks). Fee charged. Learn basic skills necessary to sail small sailboats and basic keelboats safely.

Small-Boat Sailing, Competitive
Fall and spring. Fee charged. Vanguard 420 sailboat used for the course. USYRA Rules Book used as a text for the course. Fee includes one-year membership in university sailing team program.

Skiing and Snow Boarding
Downhill Skiing and Snowboarding
Spring. Fee charged. Transportation, instruction, ski-lift fees, and skiing time are offered in a package deal. Greek Peak and Song Mountain personnel are present at registration to explain the program and accept fees. Bus transportation to Greek Peak is provided six afternoons a week for six weeks.

Cross-Country Skiing: See Outdoor Program.

Target Shooting Courses
Archery, Introduction to
Fall and spring. Two classes a week. Instruction in the care of equipment; seven basic steps for shooting, scoring, practice shooting at twenty, thirty, and forty yards.

Archery, Intermediate
Fall and spring. For those who have basic experience.

Pistol, Introduction to
Fall, spring, and summer (6 weeks). Fee charged. Instruction in the use of the pistol in the three modes of fifty-foot competitive target shooting—slow fire, timed fire, and rapid fire. Emphasis placed on safety and responsibility while firing.

Riflery
Fall and spring. Fee charged. Instruction and practice in the techniques of target rifle  from various shooting positions.

Trap and Skeet
Fall, spring, and summer (6 weeks). Fee charged. Includes lectures and shooting at the Tompkins County Rod and Gun Club range. Guns and shells are furnished.

Team Sports Courses
Basketball
Fall and spring. Fundamental drills in passing, shooting, and dribbling. Scrimmages each class session.

Ice Hockey, Introduction to
Fall and spring. Fee charged. Stick handling, passing, and shooting are stressed. Students provide their own skates and sticks; all other equipment is furnished.

Ice Hockey, Intermediate
Fall and spring. Fee charged. Prerequisite: beginning hockey or previous participation in organized hockey. This course is designed for the intermediate hockey player. Advanced techniques taught include positioning, power play, penalty killing, and offensive and defensive attack. Each session emphasizes game situations and scrimmaging. Skates and hockey sticks must be supplied by the participants. All other necessary equipment will be supplied.

Lacrosse
Fall. Instruction and practice in basic skills (cradling, passing, catching, goal shooting, checking) and team play.

Soccer
Spring. Introduction to the game. Includes basic individual skills (passing, trapping, shooting) and team play and strategy.

Team Handball
Fall and spring. Team handball combines the skills of running, jumping, catching, and throwing into a fast-moving, exciting game. Elements of soccer, basketball, hockey, and water polo all can be seen in team handball. The basic objective is to outmaneuver the opponent by passing the ball quickly and then throw the ball past the defense and goalie to score.

Volleyball, Introduction to
Fall and spring. Fundamentals of ball handling, serves, defensive blocks, and position play are stressed. Classes will scrimmage.

Volleyball, Intermediate
Fall and spring. Passing and blocking strategy; scrimmages in class.

Volleyball, Advanced
Fall and spring. Offensive and defensive team strategy is emphasized in class scrimmages.

Weight Training Courses
Nautilus
Fall, spring, and summer. (6 weeks). Enrollment limited to capacity of facilities. Fee charged. Advanced weight lifting on specifically designed apparatus. There are ten stations in the room.

Olympic Weight Training
Fall and spring. Introduces the student to the proper use of olympic weights for improving physical condition and muscular strength. Instruction with focus on the relation between high-rep light weight lifting, low-rep heavy lifting, and the development of bulk, strength, and endurance.

Universal Weight Training
Fall and spring. Classes include instruction in correct lifting techniques involving all muscle groups. Recreational classes are established for experienced lifters; structured classes are for novices. Universal weights are used.

Independent Study
Independent Study
Fall and spring. Independent study is designed for those who have difficulty fitting any of the regularly scheduled courses into their academic program. Class activities will be based on personal fitness programs. A term paper is required. Special permission to enter this program must be granted by the program director.
The School of Continuing Education and Summer Sessions provides a wide variety of educational opportunities beyond the degree-granting programs of the university. These programs serve virtually all age groups in a great variety of formats and time frames. For information about the following programs write B20 Day Hall, Ithaca, New York 14853-801; call 607/255-4987; e-mail info@sce.cornell.edu; or fax 607/255-9697; unless indicated otherwise below.

ADMINISTRATION
Glen C. Altschuler, dean
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Cathy M. Pace, registrar
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CORNELL UNIVERSITY SUMMER SESSION
The Cornell University Summer Session provides unique and unusually attractive opportunities for study and recreation at a time when the Cornell campus and the Finger Lakes region of central New York are at their loveliest and the Ithaca weather is at its best. Participants may choose from a wide spectrum of courses scheduled during three-, eight-, and six-week sessions. Although admission is open to persons of all ages, the majority of summer session participants are matriculated Cornell students. Classes meet daily and are usually kept small to foster a close association between students and teachers.

SPECIAL AND PROFESSIONAL PROGRAMS
Intensive learning experiences are presented year-round both for students and for professionals in many fields. Formats include for-credit courses of one to six weeks and noncredit weekend and weeklong short courses. Programs are also custom-designed for corporations, government agencies, professional societies, and other groups. These programs take place on the Cornell campus, on site, and at other locations worldwide. For information call 607/255-7259; e-mail sp@sce.cornell.edu; or fax 607/255-8942.

SUMMER COLLEGE PROGRAM FOR HIGH SCHOOL STUDENTS
High school juniors and seniors attend regular university courses through Cornell University Summer College and may earn college credit. They also explore career options through specially designed workshops. Students live in residence halls, become familiar with campus life, and attend seminars describing the college admissions process. The program is designed to help ease the transition from high school to college. For information call 607/255-6203; e-mail sc@sce.cornell.edu; or fax 607/255-8942.

CORNELL'S ADULT UNIVERSITY
Cornell's Adult University (CAU) offers week-long noncredit courses on campus for adults and families during the summer. During the fall, winter, and spring, there are weekend seminars, week-long domestic programs, and international study tours. Developed and led by distinguished members of the Cornell faculty, all programs are inspired by the belief that learning never ends and that one of the roles of a great university is to provide a bridge between traditional formal education and informal, noncredit study. For information, write Cornell's Adult University, 628B Thurston Avenue, Ithaca, New York 14850-2490; e-mail cau@sce.cornell.edu; or call 607/255-6260.

EXTRAMURAL STUDY
Area residents may take courses at the university on a part-time basis by registering through extramural study. Those interested may enroll in almost any course offered in the fall and spring terms if they receive the instructor's written approval. The Visitor's Program is also offered. It allows adults to attend classes in many divisions of the university on a space-available basis at a reduced charge. In this program no credit is given, and no record is kept of attendance or performance. Visitors are required to obtain written permission of the instructor.

WINTER SESSION
Cornell undergraduate and graduate students, as well as employees and area residents, can earn three to four credits between the fall and spring semesters by enrolling in the winter session. This quiet time on campus allows students to enjoy generally smaller classes and to concentrate on intensive study. Winter session students may enroll in scheduled courses or design individualized study with a faculty member.

CONTINUING EDUCATION INFORMATION SERVICE
This service provides free information, counseling, and referral to people who have been out of school for several years and want to resume their education.

EXTENDED EDUCATION INFORMATION SERVICE
This service provides information about extended education opportunities offered by the university to people inside and outside Cornell. These opportunities include short courses of all types, workshops, professional updates, and executive programs. To tell us about your offerings or to learn whether Cornell offers a course in a certain area, call 607/255-7259, fax 607/255-8942, or e-mail sp@sce.cornell.edu.

SUMMER COURSE ROSTER
The Cornell University Summer Session offers a wide variety of courses. The list that follows includes those courses that are usually offered every summer. The list is not exhaustive; many new courses or courses offered only occasionally are not listed. For complete information, contact the Summer Session Office. The summer session catalog is published in February. A preliminary course roster is available beginning in late November and current course offerings are listed and updated on CUINFO from November through June.

African Studies
AS&RC 205 African Civilizations and Culture
AS&RC 483 Themes in African History: Resistance Movements
A program in African languages is also offered. Consult the department for a complete listing.

Agricultural Economics
AG EC 220 Introduction to Business Management
AG EC 221 Financial Accounting
AG EC 310 Introductory Statistics
AG EC 320 Business Law I

Anthropology
ANTHR 101-102 Introduction to Anthropology
ANTHR 201 Lost Tribes and Sunken Continents
ANTHR 209 Biology, Culture, and Human Sexuality

Archaeology
ARKEO 100 Introduction to Archaeology
ARKEO 201 Lost Tribes and Sunken Continents
ARKEO 319 Underwater Archaeology
ARKEO 358 Field Archaeology in Honduras
ARKEO 361 Summer Program in Etruscan Archaeology at La Plana
Other field study opportunities are usually available through this department.

Architecture
ARCH 110 Introduction to Architecture: Design Studio
ARCH 130 An Introduction to Architecture: Lecture Series
ARCH 251 Introductory Photography I
ARCH 351 Photography II
Consult the Department of Architecture office for a complete list of summer design offerings.
SUMMER COURSES

**Art**
- ART 121 Introductory Painting
- ART 123 Landscape Painting
- ART 132 Introductory Graphics
- ART 133 Introductory Lithography
- ART 141 Introductory Sculpture
- ART 151 Drawing I
- ART 158 Conceptual Drawing
- ART 159 Life and Still-Life Drawing
- ART 161 Photography I
- ART 168 Black-and-White Photography
- ART 169 Color Photography
- ART 171-172 Computer Art
- ART 221 Painting II
- ART 241 Sculpture II
- ART 261 Photography II
- ART 263 Color Photography
- ART 264 Photo Processes
- ART 321 Painting III
- ART 341 Sculpture III
- ART 361 Photography III
- ART 372 Special Topics in Studio Art
- ART 379 Independent Studio

**Astronomy**
- ASTRO 105 An Introduction to the Universe
- ASTRO 106 Essential Ideas in Relativity and Cosmology
- ASTRO 107 An Introduction to the Universe

**Biological Sciences**

**General Courses**
- BIO G 107-108 General Biology
- BIO G 200 Special Studies in Biology
- BIO G 205 Ethics and Health Care
- BIO G 207 Evolution
- BIO G 208 Drawing the Human Figure
- BIO G 209 Introduction to Natural-Science Illustration

**Biochemistry, Molecular and Cell Biology**
- BIOBM 333 Principles of Biochemistry, Lectures
- BIOBM 602 Molecular Biology for Teachers

**Ecology and Evolutionary Biology**
- BIOES 261 Ecology and the Environment

**Genetics and Development**
- BIOGD 281 Genetics
- BIOGD 282 Human Genetics
- BIOGD 389 Embryology
- BIOGD 481 Population Genetics

**Microbiology**
- BIOM 290-291 General Microbiology
- BIOL 245 Plant Biology

**Plant Biology**
- BIOL 160 Oceanography of the Gulf of Maine
- BIOL 161 Introduction to Field Marine Science
- BIOL 204 Biological Illustration
- BIOL 309 Coastal Ecology and Biclimates
- BIOL 327 Neurobiology of Animal Behavior
- BIOL 329 Ecology of Animal Behavior
- BIOL 363 Marine Biology for Teachers
- BIOL 364 Field Marine Science
- BIOL 365 Underwater Research
- BIOL 366 SEA Introduction to Oceanography
- BIOL 367 SEA Introduction to Maritime Studies
- BIOL 368 SEA Introduction to Nautical Science
- BIOL 372 SEA Practical Oceanography
- BIOL 402 Marine Pollution
- BIOL 409 Ciliophorology
- BIOL 413 Adaptations of Marine Organisms
- BIOL 477 Marine Vertebrates
- BIOL 499 Undergraduate Research in Biology

**Statistics and Biometry**
- STATS 601 Statistical Methods I

**Chemistry**
- CHEM 103-104 Introduction to Chemistry
- CHEM 207-208 General Chemistry
- CHEM 251 Introduction to Experimental Organic Chemistry
- CHEM 252 Elementary Experimental Organic Chemistry
- CHEM 253-255 Elementary Organic Chemistry
- CHEM 421 Introduction to Inorganic Research
- CHEM 433 Introduction to Analytical Research
- CHEM 461 Introduction to Organic Research
- CHEM 477 Introduction to Research in Physical Chemistry

**City and Regional Planning**
- CRP 495 Special Topics

**Classics**

**Greek**
- CLASS 104 Intensive Greek

**Latin**
- CLASS 107 Intensive Latin
- CLASS 207 Catullus
- CLASS 369 Intensive Medieval Latin Reading

**Classical Civilization**
- CLASS 102 Bioscientific Terminology
- CLASS 223 The Comic Theater
- CLASS 236 Greek Mythology
- CLASS 361 Summer Program in Etruscan Archaeology at La Piana

**Communication**
- COMM 116 Theories of Human Communication
- COMM 120 Understanding Mass Communication
- COMM 191 History of Television
- COMM 201 Oral Communication
- COMM 203 Argumentation and Debate
- COMM 204 Effective Listening
- COMM 272 Principles of Public Relations and Advertising
- COMM 301 Business and Professional Speaking
- COMM 363 Organizational Writing
- COMM 410 Organizational Behavior and Communication
- COMM 460-461 Video Communication
- COMM 624 Communication in the Developing Nations
- COMM 625 Communication for Social Change
- COMM 688 Participatory Communication and Research for Development

**Comparative Literature**
- COM L 105 The Hero in Literature
- COM L 202 Great Books of the Western Tradition: The Eighteenth to the Twentieth Century
- COM L 223 The Comic Theatre
- COM L 236 Greek Mythology
- COM L 372 Selections from Contemporary World Literature

**Computer Science**
- COM S 099 Fundamental Programming Concepts
- COM S 100 Introduction to Computer Programming
- COM S 101 The Computer Age
- COM S 211 Computers and Programming
- COM S 222 Introduction to Scientific Computation
- COM S 410 Data Structures

**Economics**
- ECON 101 Introductory Microeconomics
- ECON 102 Introductory Macroeconomics
- ECON 309 Environmental Economics
- ECON 313 Intermediate Microeconomic Theory
- ECON 314 Intermediate Macroeconomic Theory
- ECON 331 Money and Credit
- ECON 362 International Monetary Theory and Policy
- ECON 363 International Economics

**Education**
- EDUC 420 Field Experience
- EDUC 494 Special Topics in Education
- EDUC 497 Individual Study in Education
- EDUC 501 Communication Workshop
CONTINUING EDUCATION - 1995-1996

Analytic Geometry and Calculus
Finite Mathematics
Mathematical Explorations
Calculus for Engineers
Precalculus Mathematics
Statistical Theory and Application in Calculus for Biologists
Linear Algebra and Calculus
Introduction to Algebra

The Engineering Cooperative Program offers a General Interest Courses
EDUC 783 Comparative Extension Education
EDUC 694 Special Topics in Education
EDUC 630 Special Problems in Agricultural and Engineering
EDUC 621-622 Work-Experience Coordinator Certification Course
EDUC 620 Internship in Education
EDUC 608 Master's-Level Thesis Research
EDUC 900 Doctoral-Level Thesis Research

Distribution Courses
ENGRG 101 The Computer Age
ENGRG 202 Mechanics of Solids
ENGRG 221 Thermodynamics
ENGRG 222 Introduction to Scientific Computation
ENGRG 211 Computers and Programming
ENGRD 270 Basic Engineering Probability and Statistics
ENGRD 203 Dynamics
ENGRD 211 Computers and Programming
ENGRD 221 Thermodynamics
ENGRD 222 Introduction to Scientific Computation
ENGRD 270 Basic Engineering Probability and Statistics
ENGL 131 Critical Reading and Writing
ENGL 132 The Personal Essay
ENGL 288-289 Expository Writing
ENGL 280 Creative Writing
ENGL 327 Shakespeare
ENGL 333 The British Novel: Origins and Development
ENGL 350 The Early Twentieth Century: 1890-1918
ENGL 477 Children's Literature

English as a Second Language
ENGLF 101-102 English as a Second Language
ENGLF 211 English as a Second Language
ENGLB 215 English for Later Bilinguals

Floriculture and Ornamental Horticulture
FRDR 210 Sketching in Watercolor
HORT 436 Tree Climbing and Arboricultural Skills

French Literature
FRLIT 221 Introduction to French Literature

Fruit and Vegetable Science
HORT 250 Fruit and Vegetable Gardening
HORT 497 Independent Study

Geological Sciences
GEOL 101 Introductory Geological Science
GEOL 102 Evolution of the Earth and Life
GEOL 104 The Sea: An Introduction to Oceanography
GEOL 213 Marine and Coastal Geology
GEOL 410 Summer Field Geology in Central Colorado

Government
GOVT 111 The Government of the United States
GOVT 161 Introduction to Political Theory
GOVT 231 Introduction to Comparative Government and Politics
GOVT 281 Introduction to International Relations
GOVT 316 The American Presidency
GOVT 441 Russian Society and Culture Today

History
HIST 101-102 Introduction to American History
HIST 151-152 Introduction to Western Civilization
HIST 268 A History of Rome from Republic to Holy City
HIST 314 History of American Foreign Policy, 1912 to the Present
HIST 340-341 Recent American History
HIST 371 World War II in Europe

History of Art
ART H 202 Survey of European Art: Renaissance to Modern
ART H 261 Introduction to Art History: Modern Art

Hotel Administration
H ADM 174 Microcomputing
H ADM 210 The Management of Human Resources
H ADM 450 Principles of Real Estate
H ADM 487 Real Estate Law—A Case Approach

Human Development and Family Studies
HDFS 115 Human Development
HDFS 150 Families and the Life Course
HDFS 216 Human Development: Adolescence and Youth
HDFS 359 American Families in Historical Perspective
HDFS 461 The Psychology of Television

Human Ecology
HE 406 Fieldwork in Professional Practice: Summer in the City

Human Service Studies
HSS 210 The Elements of Helping
HSS 315 Human Sexuality
HSS 380 Community Mental Health
HSS 492 Human Service Processes: Leadership and Community Services

Industrial and Labor Relations
Collective Bargaining, Labor Law, and Labor History
ILRCB 200/500 Collective Bargaining
ILRCB 201/501 Labor and Employment Law
ILRCB 484 Employment Discrimination and the Law
ILRCB 608 Special Topics: Sports Arbitration
ILRCB 655 Employment Law

Economic and Social Statistics
ILRST 210-211 Statistical Reasoning
ILRST 510-511 Statistical Methods for the Social Sciences

Human Resource Studies
ILRHR 266 Personal Computer Basics
ILRHR 362 Career Development: Theory and Practice
ILRHR 468 Organization and Human Resources Management Simulation

Labor Economics
ILRLE 240/540 Economics of Wages and Employment

Organizational Behavior
ILROB 170/520 Introduction to Microorganizational Behavior and Analysis: The Social Psychology of the Workplace

Jewish Studies
JWST 103 Elementary Modern Hebrew
JWST 104 Continuing Modern Hebrew
JWST 149 Introduction to Jewish Studies

Landscape Architecture
LARCH 400 AutoCAD/LANDCAD
LARCH 500 Landscape Architecture: Art of Place
LARCH 600 Site Grading Workshop

Marine Science
Consult related department listings for summer offerings in marine science.

Mathematics
MATH 101 History of Mathematics
MATH 103 Mathematical Explorations
MATH 105 Finite Mathematics
MATH 106 Calculus for Biologists
MATH 109 Precalculus Mathematics
MATH 111-112 Calculus
MATH 123 Analytic Geometry and Calculus
MATH 171 Statistical Theory and Application in the Real World
MATH 191 Calculus for Engineers
MATH 221 Linear Algebra and Calculus
MATH 293/294 Engineering Mathematics
MATH 431 Introduction to Algebra
SUMMER COURSES

Mechanical and Aerospace Engineering
M&E 221 Thermodynamics

Modern Languages and Linguistics
Chinese
CHIN 160 Introductory Intensive Chinese (Mandarin)
CHIN 201–202 Intermediate Chinese
French
FRDML 101 French Basic Course I
FRDML 123 Continuing French
FRDML 203–213 Intermediate Composition and Conversation
FRDML 630 French for Reading—Graduate Students
German
GERLA 101 German Basic Course I
GERLA 631–632 Elementary Reading
Italian
ITALA 101 Italian Basic Course I
Japanese
JAPAN 160 Introductory Intensive Japanese
JAPAN 203–204 Intermediate Japanese Conversation
JAPAN 403 Teaching of Japanese as a Foreign Language
Linguistics
LING 101 Theory and Practice of Linguistics
Nepali
NEPAL 160 Intensive Nepali (odd-numbered years)
Russian
RUSSA 121–122 Russian Elementary Course
Sinhala (Sinhalese)
SINHA 160 Intensive Sinhala (even-numbered years)
Spanish
SPAND 101 Spanish Basic Course I
SPAND 123 Continuing Spanish
SPAND 203 Intermediate Composition and Conversation
Swahili
AS&RC 131–132 Swahili
Yoruba
YORUB 121–122 Elementary Yoruba
Music
MUSIC 101 The Art of Music
MUSIC 105–106 Introduction to Music Theory
MUSIC 274 Opera
MUSIC 331 Sage Chapel Choir
Natural Resources
NTRES 215 Environmental Disturbance and Regulation
NTRES 306 Coastal and Oceanic Law and Policy
NTRES 417 Wetlands Resources
Near Eastern Studies
NES 103 Elementary Modern Hebrew
NES 104 Continuing Modern Hebrew
NES 119 Elementary Arabic
NES 394 Introduction to the Modern History of the Middle East and Africa: 1800–1960
Nutritional Sciences
NS 660 Special Topics in Nutrition
Operations Research and Industrial Engineering
OR&IE 260 Introductory Engineering Probability
OR&IE 270 Basic Engineering Probability and Statistics
OR&IE 622 Operations Research I
Philosophy
PHIL 101 Introduction to Philosophy
PHIL 145 Contemporary Moral Issues
PHIL 231 Introduction to Formal Logic
PHIL 245 Ethics and Health Care
Physical Education
Consult the Physical Education Office for a complete list of summer offerings for credit and recreation.
Physics
PHYS 101/102/103 General Physics
PHYS 112 Physics I: Mechanics and Heat
PHYS 202 The World According to Physics—the Way Things Work
PHYS 213 Physics II: Electricity and Magnetism
PHYS 214 Physics III: Optics, Waves, and Particles
PHYS 400 Informal Advanced Laboratory
PHYS 500 Informal Graduate Laboratory
PHYS 510 Advanced Experimental Physics
PHYS 520 Projects in Experimental Physics
Psychology
PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry
PSYCH 123 Introduction to Biopsychology
PSYCH 128 Introduction to Psychology: Personality and Social Behavior
PSYCH 214 Issues in Cognitive Psychology
PSYCH 280 Introduction to Social Psychology
PSYCH 311 Introduction to Human Learning and Memory
PSYCH 322 Hormones and Behavior
PSYCH 350 Statistics and Research Design
PSYCH 380 Community Mental Health
Psycology
Rural Sociology
SOC 101 Introductory Sociology
SOC 324 Environment and Society
SOC 436 Successful Aging: Today and Tomorrow
Russian Literature
RUSSL 441 Russian Society and Culture Today
Sociology
SOC 101 Introduction to Sociology
Spanish Literature
SPANL 201 Introduction to Hispanic Literature
Theatre Arts
THETR 211 Dance Movement Workshop
THETR 223 The Comic Theater
THETR 254 Theatrical Makeup Studio
THETR 277 Video Production I
THETR 285 Creativity and the Actor
THETR 287 Summer Acting Workshop
Theoretical and Applied Mechanics
T&AM 202 Mechanics of Solids
T&AM 203 Dynamics
T&AM 293–294 Engineering Mathematics
T&AM 310 Advanced Engineering Analysis I
Writing
WRIT 137 Writing Workshop
### ADMINISTRATION

Franklin M. Loew, dean  
Donald F. Smith, associate dean for academic programs  
Douglas D. McGregor, associate dean for research and graduate education  
John F. Cummings, secretary of the college  
John A. Lambert, assistant dean for administration  
Timothy T. Redden, assistant dean for public affairs  
Gloria R. Crissey, registrar, director of financial aid  
Katherine M. Edmondson, director of educational development  
Joseph A. Piekunka, director of admissions

### DEPARTMENT CHAIRS

**Anatomy:** C. Famum  
**Clinical Sciences:** M. White  
**Diagnostic Laboratory:** D. Lein  
**Microbiology and Immunology:** R. Avery  
**Pathology:** B. Pauly  
**Pharmacology:** G. Sharp  
**Physiology:** D. Robertshaw

### THE COLLEGE

The College of Veterinary Medicine offers a professional program that requires four years of full-time academic and clinical study of the normal and abnormal structure and function of the animal body and the diagnosis, treatment, and prevention of animal disease. Graduates of the college receive the Doctor of Veterinary Medicine (D.V.M.) degree, which is recognized by licensing boards throughout the world. Graduates generally enter private practice, academia, or become engaged in one of the increasing number of other biomedical activities.

Admission requires a minimum of three years of college work, including specific prerequisite courses and experience. Applications must be filed approximately one year before the proposed matriculation date. The competition for admission is keen, since there are many more qualified applicants than can be admitted.

Graduate programs in veterinary research and postdoctoral training in clinical specialties are open to Doctor of Veterinary Medicine and some highly qualified holders of baccalaureate degrees and lead to the degree of Master of Science or Doctor of Philosophy.

More detailed information is contained in the Catalog of the College of Veterinary Medicine, which may be obtained by writing to the college.

Note: 500- and 600-level courses are open only to veterinary students except by written permission from the instructor.

The College of Veterinary Medicine has revised its curriculum; the new course requirements apply to the class that matriculates in the fall of 1993 and to subsequent classes. The previous course requirements remain in effect for the Class of 1996. Courses in the revised curriculum are designated with the prefix "VTMED"; courses in the previous curriculum are designated with prefixes indicative of their originating department.

### FOUNDATION

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>VTMED 510</td>
<td>The Animal Body</td>
<td>Fall</td>
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<tr>
<td>VTMED 517</td>
<td>Animals, Veterinarians and Society,</td>
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<tr>
<td>VTMED 520</td>
<td>Genetics and Development</td>
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<td>VTMED 521</td>
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<td>VTMED 531</td>
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<td>VTMED 538</td>
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<td>VTMED 540</td>
<td>Host, Agent, and Defense</td>
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<tr>
<td>VTMED 547</td>
<td>Animals, Veterinarians and Society,</td>
<td>Part D Fall</td>
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<td>VTMED 550</td>
<td>Animal Health and Disease</td>
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<td>VTMED 551</td>
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<tr>
<td>VTMED 560</td>
<td>Applied Clinical Rotations</td>
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### DISTRIBUTION

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<tr>
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<tbody>
<tr>
<td>VTMED 601</td>
<td>Anatomy of the Carnivore</td>
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<td>VTMED 602</td>
<td>Anatomy of the Horse</td>
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<td>VTMED 603</td>
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<td>VTMED 604</td>
<td>Mechanics of Animal Movement (also VETA 604)</td>
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<td>VTMED 605</td>
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<td>VTMED 606</td>
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<td>VTMED 608</td>
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<td>VTMED 610</td>
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<td>VTMED 611</td>
<td>Fish Health Management</td>
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<td>VTMED 612</td>
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<tr>
<td>VTMED 613</td>
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<td>VTMED 614</td>
<td>Aquavet II: Comparative Pathology of Aquatic Animals</td>
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<td>VTMED 615</td>
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<tr>
<td>VTMED 620</td>
<td>Molecular Biology and Immunology of Host-Parasite Interactions (also VETM 702)</td>
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<td>Neuroendocrine-Immune Interactions</td>
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<td>VTMED 622</td>
<td>Foreign Infectious Diseases of Animals</td>
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<td>VTMED 623</td>
<td>Pathogenesis of Significant Bacterial Infections of Large Domestic Animals</td>
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<td>VTMED 624</td>
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<td>VTMED 638</td>
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<td>VTMED 639</td>
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<td>VTMED 640</td>
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<td>VTMED 641</td>
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<td>VTMED 642</td>
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<td>VTMED 651</td>
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<td>VTMED 661</td>
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<td>Physiology and Pharmacology in the Understanding and Treatment of Diabetes</td>
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<td>VTMED 680</td>
<td>Behavior Problems of Horses (also VETPH 626)</td>
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<td>VTMED 681</td>
<td>Behavior Problems of Small Animals (also VETPH 625)</td>
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<tr>
<td>VTMED 682</td>
<td>Acid Base Relations (also VETPH 627 and Biological Sciences 715)</td>
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<tr>
<td>VTMED 683</td>
<td>Fundamentals of Electrodiagnostics</td>
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</table>

### VTME Courses

- **VTMED 613**: Aquavet I: Introduction to Aquatic Veterinary Medicine, Summer.
- **VTMED 614**: Aquavet II: Comparative Pathology of Aquatic Animals, Summer.
- **VTMED 615**: Veterinary Medicine in Developing Nations, Spring 1997.
- **VTMED 620**: Molecular Biology and Immunology of Host-Parasite Interactions, also VETM 702, Spring 1996, 1998.
- **VTMED 621**: Neuroendocrine-Immune Interactions, Spring 1997.
- **VTMED 622**: Foreign Infectious Diseases of Animals, Spring.
- **VTMED 623**: Pathogenesis of Significant Bacterial Infections of Large Domestic Animals, Spring.
- **VTMED 624**: Feline Infectious Diseases, Spring.
- **VTMED 630**: Clinical Biostatistics for Journal Readers, Spring.
- **VTMED 632**: Senior Seminar Distribution, Fall, spring.
- **VTMED 633**: Introduction to Non-traditional Companion and Laboratory Animals, Spring.
- **VTMED 634**: Introduction to Large Animal Ambulatory Practice, Fall, winter, spring, summer.
- **VTMED 635**: Introduction to the Professional Literature, Spring.
- **VTMED 636**: Introduction to Dairy Management Systems, Spring.
- **VTMED 637**: Introduction to Community Practice Service, Fall, winter, spring, summer.
- **VTMED 638**: Physiological Nutrition, Spring.
- **VTMED 639**: Small Animal Dentistry, Spring.
- **VTMED 640**: Veterinary Aspects of Captive Wildlife Management, Spring.
- **VTMED 641**: Approaches to Problems in Canine Infectious Disease, Spring.
- **VTMED 642**: Management of Fluid and Electrolyte Disorders, Spring.
- **VTMED 643**: Embryo Transfer, Spring.
- **VTMED 650**: Veterinary Parasitology: Large Animal, Spring 1997.
- **VTMED 651**: Osteoarthritis, Spring.
- **VTMED 661**: Surgical Pathology, Fall, winter, spring, summer.
- **VTMED 662**: The Bottom Line, Fall, spring.
- **VTMED 663**: Wildlife Pathology, Spring.
- **VTMED 670**: Drug Handling in the Body, Spring.
- **VTMED 671**: Autonomic Pharmacology, Spring 1997.
- **VTMED 672**: Antimicrobial Drug Therapy in Veterinary Medicine, Spring.
- **VTMED 673**: Growth Factor-Coupled Signal Transduction, Spring 1997.
- **VTMED 674**: Physiology and Pharmacology in the Understanding and Treatment of Diabetes, Spring 1997.
- **VTMED 680**: Behavior Problems of Horses, also VETPH 626, Spring.
- **VTMED 681**: Behavior Problems of Small Animals, also VETPH 625, Spring.
- **VTMED 682**: Acid Base Relations, also VETPH 627 and Biological Sciences 715, Fall, spring.
**Special Projects and Research in Pharmacology**

**VETPR 711** The Role of Calcium in Stimulus-Secretion Coupling Fall, spring, and summer.

**VETPR 712** Eosinophil Stimulus-Response Coupling Fall, spring, and summer.

**VETPR 713** Mechanisms of Growth-Factor Action Fall, spring, and summer.

**VETPR 714** Central Nervous System Neurotransmitters Fall, spring, and summer.

**VETPR 718** Structure-Function of the Nicotinic Acetylcholine Receptor Fall, spring, and summer.

**VETPR 720** Modulation of Nicotinic Acetylcholine Receptor Function Fall, spring, and summer.

[**VETPR 723** The Role of Calcium in the Control of Electrolyte Transport Fall, spring, and summer 1996–97, 1997–98.]

[**VETPR 724** The Control of Hormone Secretion Fall, spring, and summer 1996–97, 1997–98.]

**VETPR 730** Graduate Research in Pharmacology Fall, spring, and summer.

**Special Topics in Pharmacology**

**VETPR 742** Receptor Mechanisms Fall, spring, and summer.

**VETPR 745** Biochemical Neuropharmacology Fall, spring, and summer.

**VETPR 747** Amino Acid Neurotransmitters Fall, spring, and summer.

**VETPR 748** Stimulus-SECRETION Coupling Fall, spring, and summer.

**VETPR 749** Second Messengers in Cell Activation Fall, spring, and summer.

**VETPR 750** Cell Calcium Fall, spring, and summer.

[**VETPR 755** Calcium in the Control of Hormone Secretion Fall, spring, and summer 1996–97, 1997–98.]  

[**VETPR 756** Mechanisms of Calcium Handling Fall, spring, and summer 1996–97, 1997–98.]  

[**VETPR 757** Intestinal Electrolyte Transport Fall, spring, and summer 1996–97, 1997–98.]  

**VETPR 760** Advanced Topics In Pharmacology Fall, spring, and summer.

**PHYSIOLOGY**

[Biological Basis of Sex Differences (Biological Sciences 214) Fall.]

Histology: The Biology of the Tissues (Biological Sciences 313) Fall.

Cellular Physiology (Biological Sciences 316) Spring.

**VETPH 346** Introductory Animal Physiology (also Biological Sciences 311) Fall.

Mammalian Physiology (Biological Sciences 458) Spring.

Undergraduate Research in Biology (Biological Sciences 499) Fall and spring.

**VETPH 612** Research Opportunities in Veterinary Medicine Fall, January, spring, and summer.

Lipids (Biological Sciences 619 and Nutritional Sciences 602) Fall.

**VETPH 625** Problems in Dog and Cat Behavior (also VTMED 681) Spring.

**VETPH 626** Problems in Equine Behavior (also VTMED 680) Spring.

**VETPH 627** Acid-Base Relations (also Biological Sciences 715) Fall, spring, and summer.

**VETPH 628** Graduate Research in Animal Physiology (also Biological Sciences 719) Fall and spring.

[Structure and Function of Joints with Emphasis on Arthritis (Biological Sciences 717) Fall 1996, 1998.]


**VETPH 720** Special Problems in Physiology Fall and spring.

[**VETPH 752** Biological Membranes and Nutrient Transfer (also Biological Sciences 618) Spring.]  


Fundamentals of Endocrinology, Lecture (Animal Sciences 427) Fall.

Fundamentals of Endocrinology, Laboratory (Animal Sciences 428) Fall.


Physiological Control of Food and Water Intake: Hunger and Thirst (Biological Sciences 711) Fall 1995.

Membrane and Epithelial Transport (Biological Sciences 712) Fall 1995, 1997.

Thermal Regulation and Exercise (Biological Sciences 713) Fall 1995, 1997.

Plasma Lipoprotein (Biological Sciences 712) Spring.

**FACULTY ROSTER**

Aquirre, Gustavo D., Ph.D., U. of Pennsylvania. Alfred H. Caspary Professor, Clinical Sciences

Ainsworth, Dorothy M., Ph.D., U. of Wisconsin-Madison. Asst. Prof., Clinical Sciences

Antczak, Douglas F., Ph.D., U. of Cambridge (England). Dorothy Havemeyer McGonville Professor of Microbiology and Immunology

Appel, Max J., Ph.D., Cornell U. Prof., Microbiology and Immunology

Atwood, Stephen W., Ph.D., Cornell U. Prof., Microbiology and Immunology

Babish, John G., Ph.D., Cornell U. Assoc. Prof., Physiology

Baines, Joel, Ph.D., Cornell U. Asst. Prof., Clinical Sciences

Ball, Barry A., Ph.D., Cornell U. Assoc. Prof., Clinical Sciences

Barr, Stephen C., Ph.D., Louisiana State U. Asst. Prof., Clinical Sciences

Bell, Robin G., Ph.D., Australian National U. Prof., Microbiology and Immunology

Bertram, John E., Ph.D., U. of Chicago. Asst. Prof., Anatomy

Beyenbach, Klaus W., Ph.D., Washington State U. Prof., Physiology

Bloom, Stephen E., Ph.D., U. of Pennsylvania. Prof., Microbiology and Immunology

Blue, Julia T., Ph.D., U. of Pennsylvania. Assoc. Prof., Physiology

Bowman, Dwight D., Ph.D., Tulane U. Assoc. Prof., Microbiology and Immunology

Bowser, Paul R., Ph.D., Auburn U. Assoc. Prof., Microbiology and Immunology

Calnek, Bruce W., D.V.M., Cornell U. Prof., Veterinary Pathology

Rudolph J. and Katherine L. Steffen Prof., Microbiology and Immunology

Campbell, S. Gordon, Ph.D., Cornell U. Prof., Microbiology and Immunology

Carmichael, Leland E., Ph.D., Cornell U. John M. Olin Professor of Virology; Clinical Sciences

Casey, James W., Ph.D., U. of Chicago. Assoc. Prof., Microbiology and Immunology

Center, Sharon A., D.V.M., U. of California at Davis. Assoc. Prof., Clinical Sciences

Cerione, Richard A., Ph.D., Rutgers U. Prof., Pharmacology

Chang, Ying Fu, Ph.D., Texas A&M. Asst. Prof., Diagnostic Laboratory

Cooper, Barry J., Ph.D., U. of Sydney (Australia). Prof., Pathology

Corradino, Robert A., Ph.D., Cornell U. Assoc. Prof., Physiology/Section of Physiology

Cummins, John F., Ph.D., Cornell U. Prof., Anatomy

Dael, Peter F., Ph.D., U. of California at Davis. Asst. Prof., Clinical Sciences

Delahunta, Alexander, Ph.D., Cornell U. James Law Professor of Veterinary Anatomy

Dietert, Rodney R., Ph.D., U. of Texas at Austin. Prof., Microbiology and Immunology

Diven, Thomas J., D.V.M., U. of Georgia. Assoc. Prof, Clinical Sciences

Dobson, Alan, Ph.D., U. of Aberdeen (Scotland). Prof., Physiology/Section of Physiology

Dubovi, Edward J., Ph.D. of Pittsburgh. Assoc. Prof., Diagnostic Laboratory

Ducharme, Normand G., D.V.M., U. of Montreal (Canada). Assoc. Prof., Clinical Sciences

Dykes, Nathan L., D.V.M., Cornell U. Asst. Prof., Clinical Sciences

Erb, Hollis N., Ph.D., U. of Guelph (Canada). Prof., Clinical Sciences

Farnum, Cornelia, Ph.D., U. of Wisconsin-Madison. Assoc. Prof., Anatomy


Fortune, Joanne E., Ph.D., Cornell U. Prof., Physiology

Fox, Francis H., D.V.M., Cornell U. Prof. Emeritus, Clinical Sciences

French, Tracy W., D.V.M., Purdue U. Assoc. Prof., Pathology

Fubini, Susan L., D.V.M., U. of Georgia. Assoc. Prof., Clinical Sciences

Gilbert, Robert O., D.V.Sc., U. of Pretoria (South Africa). Assoc. Prof., Clinical Sciences

Gilmour, Robert F., Jr., Ph.D., SUNY—Upstate Medical Center. Assoc. Prof., Physiology

Cummiskey, Robert D., D.V.Sc., U. of Liverpool (England). Assoc. Prof., Clinical Sciences

Groom, Yrto T., Ph.D., College of Veterinary Medicine, Helsinki (Finland). Assoc. Prof., Clinical Sciences

Guan, Jun-Lin, Ph.D., U. of California at San Diego. Asst. Prof., Pathology

Guard, Charles L. III, Ph.D., Case Western Reserve U. Assoc. Prof., Clinical Sciences

Hackett, Richard P., Jr., D.V.M., Ohio State U. Assoc. Prof., Clinical Sciences

Harvey, H. Jay, D.V.M., Kansas State U. Assoc. Prof., Clinical Sciences

Henion, John D., Ph.D., SONY at Albany. Prof., Diagnostic Laboratory

Hernandez, John W., Ph.D., U. of Florida. Assoc. Prof., Anatomy

Hombrook, William E., D.V.M., Oklahoma State U. Assoc. Prof., Clinical Sciences

Houp, Katherine A., Ph.D., U. of Pennsylvania (Prof., Physiology/Section of Physiology)

Houp, T. Richard, Ph.D., U. of Tennessee. Prof., Physiology/Section of Physiology

Jacobson, Richard H., Ph.D., Montana State U. Assoc. Prof., Diagnostic Laboratory

Kalfelz, Francis A., Ph.D., Cornell U. Prof., Clinical Sciences

Kern, Thomas J., D.V.M., U. of Missouri. Assoc. Prof., Clinical Sciences
PROGRAM OF STUDY

Introduction
The College of Arts and Sciences at Cornell is a community of about 4,000 undergraduates and 600 faculty members. It is composed of those departments that teach and study the humanities and the arts, the basic sciences and mathematics, the social sciences and history. It is also a college within a university of about 18,000 students and 1,630 faculty members, and this wider community provides strength and diversity of applied and professional studies beyond what an isolated undergraduate institution can offer. Students may draw upon the knowledge and facilities of the other undergraduate colleges at Cornell to supplement their studies. Finally, the college is a graduate school and research center attracting faculty whose writing and research require first-rate academic facilities and whose participation in undergraduate teaching brings to the students the profound questioning and the current ideas of modern scholarship. It is this abundant variety and outstanding quality among many disciplines that gives the college its distinctive character.

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

Summary of Basic College Requirements for Graduation

1) Freshman Writing Seminars: Two courses.
2) Foreign language: Up to four courses to obtain proficiency in one language or up to six (but usually fewer) to obtain qualification in two.
3) Distribution Requirements: See below.
4) Major.
5) Electives: Four or five courses (at least 15 credits) in courses not used to fulfill other requirements and not in the major field.
6) Residence: Eight full-time semesters, unless a student can successfully complete all other requirements in fewer than eight semesters and meets the criteria to accelerate graduation. (See "Acceleration," under the heading "Residence.")
7) Minimum number of courses: Thirty-four courses. A two-credit course counts as half a course; a six-credit language course counts as one and one-half courses; a one-credit course does not count toward this requirement. (See under "Courses and Credits," below.)
8) Credits: A total of 120 credits, of which 100 must be taken in the College of Arts and Sciences.
9) Physical education: Completion of the university requirement (two courses). Please note that physical education credit does not count toward graduation or toward the 12-credit minimum required for good standing each semester. See p. 13.
10) Application to graduate.

Freshman Writing Seminars
See "John S. Knight Writing Program." Freshman Writing Seminars may not be counted toward the distribution requirements.

Foreign Language Requirement
The faculty considers competence in a foreign language essential for an educated person. Studying another language helps students understand language itself, our fundamental intellectual tool, and opens another culture for exploration. The sooner the student acquires competence, the more useful it will be. Hence work toward the foreign language requirement should be undertaken in the freshman and sophomore years.

The following departments teach foreign languages or literature or both in the College of Arts and Sciences: Africana Studies and Research Center, Asian Studies, Classics, German Studies, Modern Languages and Linguistics, Near Eastern Studies, Romance Studies, and Russian Literature.

The language requirement may be satisfied in one of two ways:

1) by attaining proficiency in one language or
2) by attaining qualification in two languages.

Proficiency
Proficiency is normally attained by passing a 200-level (intermediate) Cornell course (or Chinese or Japanese 161) or by equivalent achievement determined by examination (see chart below). Some introductory language courses are taught at the 300- or 400-level (for example, Near Eastern Studies 333-334); these do not confer proficiency.

Earning three credits on an AP language exam does not carry with it proficiency. Only by scoring high enough on the CASE (Cornell Advanced Standing Examination), does the student earn proficiency by examination. In other words, even students who earn advanced placement credit with scores of 4 or 5 on an AP language exam should take the CASE to see if they can be awarded proficiency. On the other hand, earning a 4 or 5 on an AP literature exam in French, Spanish, or German (German offers a combined language/literature exam) earns proficiency, as well as three credits, without the CASE. (Such students should take the CASE anyway to see if they can earn an additional three credits in language.)

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

1) Three years of high school study in any one language gives qualification in that language. Note that this route to qualification does not guarantee entrance into a 200-level course. Students who want to continue studying the language must be placed in the appropriate course by a score on an examination. Being placed below the 200-level, however, does not cancel the qualification.

2) Passing the requisite course: 102, 123, or 134 in most languages taught by the Department of Modern Languages and Linguistics; Chinese 112–114 or Japanese 160; Near Eastern Studies 102 or 122 in Hebrew, 112 in elementary classical Arabic, or 118 in Turkish; Classics 103 or 104 in Greek, 106 or 107 in Latin, 112 in modern Greek; 132 in Sanskrit; AS&RC 134 in Swahili.

Note: Except in the case of Sanskrit, completion of language sequences 131–132 does not constitute qualification.

3) A score of 560 or better on either the SAT II in high school or the CPT (Cornell Placement Test) during orientation week.

Students may earn a 560 placement test score at the end of a course numbered 122 (second semester of the introductory sequence) and consequently attain qualification without taking 123, the third semester of the introductory sequence. However, with a score of 560, it may be
worthwhile to take 123 anyway to be better prepared for the 200-level courses.

4) Placement into a 200-level course by departmental, sometimes individual, examination at Cornell (in cases where no placement test is available).

Placement in Language Courses and Advanced Placement Credit

Placement into language courses and advanced placement credit are separate results of examinations.

Placement

Entering students who have had two or more years of high school study in a language or who have been awarded credit for language work at another college or university may enroll in a course in the same language only after being placed by examination. The placement exam may have been taken in high school (after the last course) or at Cornell during orientation. Students may retake a language test if a year or more has passed since last taking it.

Advanced Placement Credit

Being placed into a 200-level course does not earn credit toward the degree. Credit is earned only for high school work already at the 200-level, in other words, for the equivalent of language courses numbered 200 and above here at Cornell.

The type of examination depends upon the language and the level of achievement:

1) French, German, Italian, Russian, and Spanish placement tests: students need to register for the placement tests with the Department of Modern Languages and Linguistics, 203 Mollen Hall.

2) Greek, Ancient and Modern: departmental examination, Department of Classics, 120 Goldwin Smith Hall.

3) Latin: departmental examination, Department of Classics, 120 Goldwin Smith Hall.

4) Arabic: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

5) Hebrew: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

6) Turkish: departmental examination, Department of Near Eastern Studies, 360 Rockefeller Hall.

7) Other languages: special examinations, see the professor who teaches the language.

8) Students with a placement test score of 650 or above in French, German, and Spanish: the Cornell Advanced Standing Examination (CASE).

An eligible student who does not want to do further work in a language may still earn three or six credits and proficiency from the CASE.

Depending on their placement test scores, students are eligible for the courses and Cornell Advanced Standing Examination (CASE) as listed in the charts below. For languages not listed, or for special problems, students should see the professor in charge.

<table>
<thead>
<tr>
<th>Language Courses</th>
<th>Literature Courses</th>
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<tbody>
<tr>
<td>200, 203, or 205</td>
<td>201, 220, or 221</td>
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French

Placement Test Reading Score | Language Courses | Literature Courses
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<tbody>
<tr>
<td>Below 370</td>
<td>121</td>
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<tr>
<td>370-440</td>
<td>122</td>
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<tr>
<td>450-550</td>
<td>123</td>
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<tr>
<td>560-660</td>
<td>203</td>
<td>201</td>
</tr>
<tr>
<td>650 and above</td>
<td>Apply for CASE</td>
<td></td>
</tr>
<tr>
<td>AP 4 or 5 in language, 3 credits.</td>
<td>Apply for CASE</td>
<td></td>
</tr>
<tr>
<td>AP 4 or 5 in literature, 3 credits and proficiency.</td>
<td>Apply for CASE</td>
<td></td>
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</tbody>
</table>

German

Placement Test Reading Score | Language Courses | Literature Courses
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<td>450-550</td>
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<td>560-640</td>
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<td>201</td>
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<tr>
<td>650 and above</td>
<td>Apply for CASE</td>
<td></td>
</tr>
<tr>
<td>AP 4 or 5, 3 credits and proficiency.</td>
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Italian

Placement Test Reading Score | Language Courses | Literature Courses
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<tr>
<td>650 and above</td>
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<tr>
<td>AP 4 or 5 in language, 3 credits.</td>
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</tr>
<tr>
<td>AP 4 or 5 in literature, 3 credits and proficiency.</td>
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</tbody>
</table>

Russian

Apply for the Cornell Advanced Standing Examination (CASE)

Spanish

Placement Test Reading Score | Language Courses | Literature Courses
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</tbody>
</table>

Distribution Requirements

In satisfying the distribution requirements, students become acquainted with a broad range of subject matter in the liberal arts and sciences and explore areas they may not have had the opportunity to examine. Students should see the professor in charge for further information.

Depending on their placement test scores, students are eligible for the courses and Cornell Advanced Standing Examination (CASE) as listed in the charts below. For languages not listed, or for special problems, students should see the professor in charge.

Distribution Requirements

In satisfying the distribution requirements, students become acquainted with a broad range of subject matter in the liberal arts and sciences and explore areas they may not have had the opportunity to examine.

Attaining these two goals is part of the task of freshmen and sophomores. Although students may complete the requirements over the eight semesters, they can take advanced courses in subjects they find intriguing only if they have taken the introductory courses early.

Students must take a total of nine courses of three or more credits each for the distribution requirement. Four courses from Groups 1 and 2 below, at least two of which are from Group 1, and at least one of which is from Group 2 (for example, one chemistry, one physics, one geology, and one mathematics); five courses from Groups 3 and 4 below, with at least two in each group and two in the same department; for example, one course in sociology, one in history, one in history of art, and two in theater arts. No single course may satisfy more than one distribution requirement in categories 1 through 4, and no freshman writing seminar may satisfy any of the distribution requirements. Grades of S-U in courses applied to the distribution requirements are acceptable.

Students may use one of the approved interdisciplinary courses for distribution as noted below, but may apply such courses to only one category of the distribution requirement and may not count courses offered or cross-listed by their major department for any distribution category beyond the usual category of the major department itself.

1. Physical and Biological Sciences

Primary List:

Astronomy 101 or 201, 102 or 212, 107, 201, 202, or any course numbered 300 or above

If 107 is taken, no other 100-level course can be used. Note that Astronomy 103, 104, 105, 106 do not satisfy the distribution requirement for the College of Arts and Sciences but may satisfy the requirements of another college.

Chemistry (all courses)

Geological Sciences (all courses)

Physics (all courses)

Biological Sciences: all courses except 152, 200 (unless permission of the associate director is obtained), 202, 205, 206, 208, 209, 301, or 367.

The following courses are especially suitable for the distribution requirement because they have no prerequisites: 101-104, 105-106, 107-108, 109-110, 115, 160, 170, 184, 192, 201, 207, 212, 246, 284, 296, 275.

Note that introductory biology can count for distribution credit only when taken as a two-semester sequence: 109-110, 105-106, or 101 and 103 plus 102 and 104, or 107-108, or a combination of the first term of one sequence and the second term of another.

Supplementary List: In fulfilling the science distribution requirement, students may select at least one course from the list of "primary" courses above, and may select additional courses from the following list.

Animal Science 100, 150, 212
Anthropology 101, 275, 351, 359, 474, 490
Biology and Society 301
Entomology 212
Food 200
Natural Resources 201, 210, 301
Plant Breeding 225
Psychology 123
Plant Pathology 301
2. Quantitative and formal reasoning

All courses offered by the Department of Mathematics except Math 101 and 109.
City and Regional Planning 520
Computer Science 100, 101, 172, 211, 212
Economics 321
Industrial & Labor Relations 210, 211
Operations Research & Industrial Engineering 115
Philosophy 231, 331, 431, 436
Physics 205, 209, 210
Psychology 350
Sociology 301
Statistics and Biometry 215

If students choose two courses from this list to satisfy part of the distribution requirement, those two courses may not have significant overlap. For example, students should not choose two beginning courses in statistics.

Under exceptional circumstances and upon petition, certain courses not listed above under Group 2, courses such as those appearing on the following auxiliary list, may be used to satisfy the requirement in quantitative and formal reasoning. The petition should provide a persuasive rationale both in terms of the student's course of study and in terms of meeting the goals of the requirement.

Auxiliary list: Agricultural Economics 310; Agricultural Engineering 151; City and Regional Planning 321; Industrial and Labor Relations 112; Linguistics 421, 450; Psychology 472–473 (a sequence of two two-credit courses which may count only in its entirety as one course); Sociology 420

Note on advanced placement credit

Students may apply up to two courses of approved advanced placement credit in science, mathematics, and computer science toward satisfaction of the distribution requirement in Groups 1 and 2 above, provided that they complete at least one course from the primary list of science courses during their undergraduate career. Transfer credit applied to the distribution requirement in Group 2 must be in mathematics or computer science.

3. Social sciences and history

Anthropology (all courses except Anthropology 101, 275, 571, 390, 451, 452, 453, 474, 490)
Archaeology 100, 201, 202, 203, 204, 247, 263, 275, 317, 355, 355, 362, 370, 402, 404, 458, 493, 494
Asian studies (courses in Asian anthropology, economics, government, linguistics, or sociology)
Biology and Society 342, 407, 427
City and Regional Planning 100, 101
Economics (all courses except 317, 318, 319)
Engineering 250, 292

Government (all courses)

History (all courses)

Linguistics (all courses)

Near Eastern Studies 197, 198 and all other courses in Near Eastern archaeology and history

Sociology (all courses)


4. Humanities and the arts

Africana Studies 202, 211, 285, 303, 304, 310, 422, 425, 431, 432, 435, 455
Anthropology 290, 451, 452, 453, 455
Archaeology 100, 221, 309, 320, 357, 423, 434, 520, 629
Asian Studies (208, 211, 212, 215, 218 and other courses in Asian art, literature, religion, or cultural history)
Biology and Society 205, 206
Classics (courses at the 200-level and above in Classical civilization, art, and archaeology; Classical languages at the 200-level and above)
Comparative Literature

English
French Literature

German Literature

History of Art
Italian Literature

Music (one course of at least three credits, excluding musical performance, organizations, or ensembles; or two courses, which may include four credits in musical performance or three credits in organizations or ensembles, but not both).
Near Eastern Studies (courses in Near Eastern civilization or literature, including language courses at the 200-level and above)

Philosophy (all courses except courses in logic)

Religious Studies 101
Russian Literature

Science and Technology Studies 205, 206, 286, 381, 384, 389, 390, 481, 661, 681
Spanish Literature

Theatre Arts (except for technical production studies)


Students may apply no advanced placement credit toward satisfaction of the distribution requirement in Groups 3 and 4. Students majoring in one of the departments of the social sciences or humanities may apply up to three courses from their major toward distribution.

5. Breadth requirements

Students must include in their undergraduate curriculum at least one course that focuses on an area or a people other than those of the United States, Canada, or Europe, and one course in an historical period before the twentieth century. (Courses focusing on Native American cultures may count toward the breadth requirement.) Courses that satisfy the first breadth requirement, geographical breadth, are marked with an * when described in this catalog. Courses that satisfy the second, historical breadth, are marked with an **. Many courses satisfy both requirements, and students may in fact use the same course to satisfy both. They may also apply courses conferring proficiency in a non-Western language toward the geographical breadth requirement and uncredited courses satisfying the distribution, major, or elective (but not writing) requirements in satisfaction of either of the breadth requirements. Credit awarded by examination may not be applied to either of the breadth requirements.

The Major

In their last two years, students devote roughly one-half their time to acquiring depth and competence in a major subject. The choice of major is not intended to define a student's intellect or character or to lead to a lifetime's occupation, although it may do some of each. By majoring, students focus the full extent of their imaginative and intellectual capacities on something they care about and sharpen their minds in the process.

Sophomores must be accepted by departments as majors before registering for courses for the junior year. Most departments and programs specify certain prerequisites for admission to the major; students should consult the departmental listings on the following pages. A department may refuse to accept into the major any student whose performance does not meet departmental standards. To seek admission into a major, students take a copy of their transcript to an appointment with the director of undergraduate studies in their prospective major department.

Available majors. Majors are offered by each of the departments. There are also majors in American studies, archaeology, biology and society, dance, film, religious studies, Russian and East European studies, and women's studies.

Some students want to pursue an interest that cannot be met within an established major. They may plan, with the help of their faculty adviser, an independent major that includes courses from several departments. See "Independent Major Program," below, under "Special Academic Options."

Students are responsible for completing their majors according to the regulations and with the approval of their departments. Courses that fulfill major requirements may not be taken for S-U grades.
Double Majors

One major only is required for graduation. Some students choose to complete two majors. No special permission or procedure is required, students simply become accepted into both majors and find an adviser in each department. Both majors will be posted on the official transcript. Double majoring often results in a narrower, less interesting curriculum than a single major with well-selected, advanced-level electives or a concentration, especially if the majors are in closely related fields.

Electives

Of the 34 courses and 120 credits required for graduation, almost one-third are free electives. How students use these electives frequently makes the difference between an ordinary and a truly interesting curriculum. Students must complete at least four courses and at least 15 credits offered outside the major field and not used to fill another requirement. AP credits not otherwise used may be used to fulfill elective requirements. It is possible to major in one field, group electives to form a concentration separate from their major or even a second major. Some choose to explore a variety of subjects. Electives taken in other divisions of the university may be used to gain practical training or specialized knowledge. Some students develop a concentration in one particular department or subject outside arts and sciences. Students who choose to complete two majors may count courses in one of those majors as “ electives.”

Residence

Eight semesters of full-time study in the College of Arts and Sciences are integral to earning the A.B. degree. Even if the minimum requirements can be met in fewer semesters, the faculty of the college expects students to take advantage of the resources of the university for eight full terms and obtain as rich and advanced an education in the liberal arts and sciences as possible.

Approved study abroad: SEA Semester, and Cornell-in-Washington are considered semesters of residence, but students may spend no more than two semesters on such programs and must be on campus during their last semester. Mid-year freshmen who study full-time in an approved curriculum at another institution during the fall preceding their matriculation in the college may, if they wish, count that semester as a semester of residence.

Semesters of extramural study in the Division of Continuing Education and Summer Sessions do not count as semesters of residence.

Transfer students from other institutions must spend a minimum of four semesters on the Cornell campus in Ithaca. Transfers from other colleges at Cornell must spend four semesters on campus in Ithaca as students in the Internal Transfer Division or in the college.

Students occasionally enter with advanced placement credit from other institutions, take leaves and complete courses at other institutions, or take summer courses at other institutions. The college will accept credit for such courses if they are comparable to courses offered by departments at Cornell and are approved by those departments (approval forms are available in the Office of the Registrar, M46 Goldwin Smith Hall). Students may not count such credit, however, as part of the 100 credits required in the College of Arts and Sciences. They may use such credit to replace a term of residence if they petition to accelerate (see below), but such credit must be earned before the last semester prior and not during a required academic leave. Students may not leave the college after fewer than eight semesters of residence and complete their undergraduate degrees with credits earned at other institutions or as part-time or summer students at Cornell.

Acceleration. Some students decide that they do not need eight semesters of residence to obtain a solid undergraduate education. These students should discuss their plans with their major adviser and an advising dean, and must meet certain requirements in addition to those required of other students.

1. Accelerants must meet either condition a or b:
   a. Complete 60 credits before the beginning of the last four semesters and complete the prerequisites for admission to the major in time to spend four semesters in the major.
   b. Pass 48 credits in College of Arts and Sciences courses numbered “300” and above. Upper-level courses taken in other colleges at Cornell University may count as College of Arts and Sciences credit only if approved for the major.

2. All accelerants are required to complete 100 credits at C or above. Courses completed with a grade of “S” will count toward the 100 credits.

3. Students may not use credits earned while on required leave of absence to reduce their terms of residence.

4. Accelerants may not finish the degree with credits earned in summer or winter session, through part-time study (unless they meet the guidelines for part-time study), a Credit-in-Advance program, including Cornell-in-Washington, SEA Semester, or study abroad. That is, they may not exit through any program other than a regular, full-time Cornell semester in Ithaca. Students matriculating as freshmen may not compress their undergraduate education into fewer than six semesters of residence.

Transfer students, both from other institutions and from other colleges at Cornell, must spend at least four semesters in the college on campus in Ithaca.

Ninth term. Students who can graduate in eight semesters should do so. If someone has a worthy academic plan for a full ninth or tenth semester, the dean for seniors can approve that plan and the registrar of the college to enroll the student as a special student for the additional work. Such a status allows enrollment in a full schedule of courses for full tuition and full use of campus resources, but allows financial aid only from loans or outside agencies, not from Cornell funds. Students who need only a part-time schedule of courses in a ninth or tenth term in order to graduate should complete the outstanding courses as an extramural student. Students may spend a ninth term in residence only with permission of the dean for seniors or the Committee on Academic Records. Such permission is normally granted only under circumstances such as the following:

1. Students who have been ill or have an exceptionally compelling academic plan.
2. Dual-degree students, who are pursuing a formalized five-year university curriculum.
3. Students attracted late to a field with a hierarchical curriculum (for example, physics).
4. Students who are academically under-prepared for the curriculum at Cornell and need to begin with a lighter schedule of courses than normal. (See Assistant Dean Turner, Academic Advising Center, 55 Goldwin Smith Hall, about this option.)

Part-time study. Students in good academic standing may take a personal leave of absence and enroll in the Division of Continuing Education, but such semesters of part-time study do not count as terms of residence. Students are allowed to earn their degrees as part-time students only if they present convincing academic or medical reasons for a reduced schedule or if they are Ithaca residents who are also part-time workers. Students may complete their degrees as part-time students at Cornell after fewer than eight semesters of full-time residence only if:

1) They have completed all degree requirements by the end of the seventh term, and could have received permission to accelerate.
2) They have received permission to accelerate, but have been forced to drop or delay a course for reasons beyond their control.
3) They are writing an honors thesis and can complete all degree requirements by taking two or fewer courses, one of which is the thesis itself.

Courses and Credits

Students must complete at least 34 courses to graduate, that is, an average of four courses during each of six semesters and five courses during each of two semesters. A three- or four-credit course counts as one course; a two-credit course counts as 0.5 courses. Single-credit courses do not count as part of the 34 except in certain cases when they form a part of a series (certain offerings in biology, music, and theatre arts) and two in the same series can be aggregated to count as one-half course. A six-credit language course counts as 1 1/2 courses, while the summer Falcon Programs in Asian languages count as 10 credits and 2 1/2 courses each. Archaeology and geology fieldwork for more than six credits count as two courses each. Biology 281 counts as 1 1/2 courses. Other five- or six-credit courses count as one course.

Students must also complete 120 credits, 100 of which must be from courses taken in the College of Arts and Sciences. Courses approved for study abroad during a semester or academic year of full-time study (not summer study) and courses taken in certain off-campus residential programs may be counted toward the 100 credits required within the college and also toward the required credits. Advanced placement credits and credits earned in other colleges at Cornell, or in any subject at U.S. institutions other than Cornell, do not count as part of the 100. The only exception is for courses (no more than three) that certain departments accept from other colleges at Cornell as fulfilling major 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.

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 and the arts.

3) Courses may count toward breadth requirements and toward any other requirement except freshman writing seminars.

Repeating courses. Students occasionally repeat courses. If the instructor certifies that the course content has been changed, credit will be granted a second time. If the content has not changed, both grades will appear on the transcript and will be included in any average that is calculated, but credit will be counted toward the degree only once. Students who plan to repeat a course should submit a petition to an advising dean. If the original course grade was F, no petition is necessary.

Transferring credit. The college evaluates credit received from either another school or college at Cornell University or another accredited institution of collegiate rank to determine the number of credits and courses the student may apply toward the various requirements for the Bachelor of Arts degree at Cornell. Credit evaluations are normally provided to external transfers at the time they are notified of their admission.

Transfer students must successfully complete at least 60 credits and 16 courses at Cornell; they must be in residence for four regular semesters. Summer session does not count toward the residence requirement. Advanced placement credit awarded by other colleges, either at Cornell or elsewhere, is subject to a re-evaluation by the college.

Advanced placement credit. See p. 5.

Summer session credit. A student may earn credit toward the degree by completing courses in Cornell's summer session or by petitioning to take courses at other colleges. Students should consult their advisors regarding summer study plans.

Credit for summer courses not taken at Cornell must be approved by the appropriate Cornell department. Approval forms and information are available in the Office of the Registrar, M46 Goldwin Smith Hall. Credit earned in other summer courses taken at Cornell will not count toward the 100 credits required in the college (including summer or orientation programs abroad). Transcripts from other institutions should be sent to the associate registrar, M46 Goldwin Smith Hall. Entering students who want to receive credit toward the degree for courses completed in a summer session away from Cornell should have transcripts sent to the associate registrar, M46 Goldwin Smith Hall, during the summer before matriculation. Credits completed in Cornell summer sessions will be given automatically.

Summer session at Cornell or elsewhere does not count toward the eight-semester residence requirement.

Noncredit courses. The college does not grant credit toward the degree for every course offered by the university. Courses in remedial or developmental reading, supplemental science and mathematics courses offered by the Learning Skills Center, keyboarding, shorthand, and military training courses are among those for which credit is not given and which do not constitute part of the 12 credits required for good academic standing (see list below). Faculty legislation strictly prohibits granting credit toward the degree for service as an undergraduate teaching assistant, even though the department may record credit for such service on the transcript.

Auditing. The college encourages its students to take advantage of its rich curriculum by sitting in on courses that interest them but do not fit into their schedules for credit. As long as the instructor agrees, students are welcome to visit courses. Small seminars and language courses are sometimes not open to auditors. Audited courses do not, of course, appear on the student's schedule or transcript.

Noncredit courses:
- All courses numbered below 100 (for example, Computer Science 099)
- All courses in Military Science, Naval Science, and Aerospace Studies
- Biology G 498
- Communications 498
- Education 498
- Hotel Administration 161, 171, 261, 263
- Human Development and Family Studies 403
- Human Ecology 100
- Human Service Studies 403
- Mathematics 109
- Nutritional Science 403
- Psychology 498

Physical Education
See "University Requirements for Graduation," p. 13. The college does not count physical education credit toward the 120 credits required for graduation, nor toward the twelve credits required for good standing each semester.

SPECIAL ACADEMIC OPTIONS

Degree Programs
The following programs allow students to work toward more than one degree or to alter the regular college requirements or departmental requirements for the major.

Independent Major Program
The Independent Major Program allows students to design their own interdisciplinary majors if they want to pursue an interest that cannot be met within an established major. Proposals for an independent major must be equivalent in coherence, breadth, and depth to a departmental major, well suited to the student's academic preparation, and consistent with a liberal education. Proposals must also be supported by a faculty adviser and are assessed by a board of faculty members. Independent majors substitute for established majors, but students must still satisfy all the other requirements for the baccalaureate degree. Students should contact the director of the Independent Major Program, Academic Advising Center, M50 Goldwin Smith Hall, for further information. Deadlines for submitting independent major proposals are listed on the calendar supplement for the College of Arts and Sciences.

College Scholar Program
The College Scholar Program frees up to forty students in each class from the usual college requirements for a degree and allows them to design their own curricula. It is meant to serve students whose interests and talents would benefit from a little more academic freedom than other students have, who demonstrate exceptional promise, and who show the maturity to plan and carry out, with the help of their adviser, a well-designed program of studies. College Scholars do not all design the same kind of program: some, for instance, pursue diverse interests, while others integrate a variety of courses with a common theme.

College Scholars must complete 120 credits of course work (100 in the college), 34 courses, and, unless they receive special permission from the program to accelerate, eight full terms of undergraduate study. They must complete the physical education requirement. All College Scholars must design a senior project. They are not required to complete or fulfill the distribution requirements, although members of the College Scholar Advisory Board believe that the spirit of the requirement is a good one.

Each applicant to the College Scholar Program is asked to write an essay, which is due the last Wednesday in April of the freshman year. Mid-year freshmen apply at the end of their first spring semester in the college. Students should contact the Academic Advising Center, M50 Goldwin Smith Hall, for further information.

Dual-Degree Program with Other Colleges
The Dual-Degree Program enables especially ambitious undergraduate students to pursue programs of study in two colleges. Dual-degree candidates may earn both a Bachelor of Arts degree from the College of Arts and Sciences and (1) a Bachelor of Science degree from the College of Engineering or (2) a Bachelor of Fine Arts degree from the Department of Art in the College of Architecture, Art, and Planning or (3) a Bachelor of Science degree in urban and regional studies from the Department of City and Regional Planning in the College of Architecture, Art, and Planning or (4) a Bachelor of Science degree in architectural history from the Department of Architecture in the College of Architecture, Art, and Planning. Students enter one of these colleges as freshmen or sophomores and begin the Dual-Degree Program with the second college in the second or, in some cases, the third year. The Dual-Degree Program ordinarily takes five years to complete, and students are eligible for five years of financial aid. For further information students should contact Assistant Dean Saraydar, Arts and Sciences Admissions, 172 Goldwin Smith Hall.
Double Registration with Professional Schools

Registration in the senior year of the College of Arts and Sciences and the first year of Cornell Law School, Cornell Medical College, or the Johnson Graduate School of Management, is possible. A few exceptionally well-prepared students who have earned 105 credits before the start of the senior year and have been accepted by one of the above-named professional schools may be permitted to register simultaneously with the college and in one or another of these professional schools during the seventh and eighth terms. Students with eight or fewer credits to complete may apply to enter the Master's of Engineering program during the eighth semester.

Students interested in the joint program with the Law School or the Graduate School of Management, or the Master's of Engineering program should see the dean for seniors, Academic Advising Center, 55 Goldwin Smith Hall.

Students registering simultaneously in the college and in the Cornell Medical College receive the Bachelor of Arts degree after the first year of medical studies and the Doctor of Medicine degree after the remaining three years of medical college are completed. Interested students should contact the schools for details.

Students registering in both the College of Arts and Sciences and the Cornell Medical College must, of course, complete all requirements for the A.B. degree, including 100 credits in College of Arts and Sciences courses.

Teacher Education in Science and Mathematics

Students at Cornell may pursue teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. Teacher Education in Science and Mathematics (TESM) is a university program jointly conducted by the departments of education and mathematics. Although TESM offers options for undergraduate and graduate study, most students enroll in a five-year program, which combines an undergraduate major in mathematics or one of the sciences with a one-year Master of Arts in Teaching degree (MAT). Students from any college at Cornell are eligible for the MAT degree for work satisfactorily completed.

More information, contact the TESM student support specialist at 255-9255 or the program coordinator, D. Trumbull, 255-3108.

Special-Interest Options

The following options do not alter the college's requirements but enable students to pursue special interests within the usual program.

Informal Minors

Some students organize electives within a discipline or department. Such informal minors are not noted on the transcript.

Concentrations

Interdisciplinary concentrations, described in the pages following, allow students from any college at Cornell to major in subjects not formally established within the college's requirements but enable students to pursue special interests within the usual program. Students interested in this program should see the program coordinator, D. Trumbull, 255-3108.

Independent Study

Independent study affords students the opportunity to pursue special interests or research not treated in regularly scheduled courses. A faculty member, who becomes the student's instructor for the course, must approve the program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study (proposal forms are available in the college registrar's office, M46 Goldwin Smith Hall). In one semester students may earn up to six credits with one instructor or up to eight credits with more than one instructor.

Undergraduate Research Program

One of the best ways to benefit from being an undergraduate at a research university and at Cornell in particular is to become an apprentice in on-going faculty research. About 400 students participate each year in creating new knowledge and earning independent student credit for what they learn and contribute. They sharpen their critical and creative abilities and can test their interest in pursuing a research career. Sometimes they publish their work.

The Undergraduate Research Program in Goldwin Smith Hall gathers information about research opportunities in most disciplines of the liberal arts and sciences, guides students in finding further opportunities — both on campus and elsewhere and both during the academic year and the summer — and helps students prepare for research and present themselves as candidates for apprenticeships. While many students locate research opportunities independently, faculty whose courses they have taken, through their major departments, or through published materials, they, as well as the ones who find their projects through the Undergraduate Research Program, benefit from the resources of the program in learning about the process of research.

The Cornell Undergraduate Research Board, an undergraduate organization, conducts an annual open house to help students get started in research and an annual forum at which undergraduates present their work. Students interested in this program should see Assistant Dean Williams, Academic Advising Center, 55 Goldwin Smith Hall.

Language Study

More than forty languages are taught in the College of Arts and Sciences; some of them are taught 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 departments of Modern Languages and Linguistics and the departments that specialize in literary and cultural study: the Africana Studies and Research Center and the departments of Asian Studies, Classics, German Studies, Near Eastern Studies, Romance Studies, and Russian Literature. Students interested in any of these courses should see the language house director or the departmental chair.

FALCON (Full-Year Asian Language Concentration). FALCON affords students who are interested in the Far East to study Chinese, Indonesian, or Japanese exclusively for one year. They gain proficiency in the language and familiarity with the culture. Students who are interested in the Far East should be aware of the opportunities here to pursue rapid and thorough beginning studies on campus with the objective of studying abroad later—in China, Japan, or Southeast Asia.

Language House Program

A complement to classroom cultural and linguistic instruction, the Language House Program combines residential and academic opportunities for developing and practicing conversational skills in French, German, Italian, Japanese, Mandarin Chinese, Russian, and Spanish. It helps prepare students who plan to study abroad and helps returning students share their cultural experiences while further increasing their language skills.

Students interested in this program should see Academic Administrator Evenett, 136 Goldwin Smith Hall.

Prelaw Study

Law schools neither require nor prefer any particular program of study; they do seek students with sound training in the liberal arts and sciences. It is, however, advisable that students plan a program in which they are interested and do well. Beyond that, students are advised to take courses that will develop their powers of precise, analytical thinking and proficiency in writing and speaking.

The college offers a concentration in law and society. Students should work toward completion of this concentration because they find it interesting, not because they believe it will convince law schools of their interest.

The adviser for students in the College of Arts and Sciences who are applying to law school is Assistant Dean Cox, Arts and Sciences Admissions, 172 Goldwin Smith Hall.

Premedical Study

The breadth and depth afforded by a liberal arts education are invaluable for people who plan medical careers, whether they intend to practice or go into medical research. Such training has a profound effect on the doctor's usefulness to patients, and it affords the flexibility of mind that is needed for major research undertakings. Medical and dental schools do not prescribe or even prefer a particular major, they, however, require particular undergraduate courses, and most students are well advised to begin chemistry in their freshman year. Students who are interested in medical careers are urged to visit the Health Careers Office, 203 Barnes Hall.

The adviser for students in the College of Arts and Sciences who are planning careers in medicine is Assistant Dean Turner, Academic Advising Center, 55 Goldwin Smith Hall.

Off-Campus Programs

Many students find it important to their majors or to their overall academic programs to study off campus or abroad for one or two semesters. When it makes academic sense, the college encourages its students to pursue such studies and grants credit toward the degree for work satisfactorily completed.

Study Abroad

Each year about 200 undergraduates in Arts and Sciences include semester- or year-long study abroad as part of their formal under-
graduate education. Ideally, study abroad builds upon a broad liberal arts background in the early semesters: area studies, language training, and preparation in the proposed field of study are all essential.

The college encourages wherever possible study at foreign institutions alongside their degree candidates rather than study in self-contained programs that offer courses specially designed for foreigners. The goals of this educational immersion are several: to deepen students’ understanding of the organization of knowledge into disciplines with their own methodologies and perspectives; to involve students in social relationships with peers who may hold a new and unique range of social attitudes; to hear from leading academics the modes of inquiry, methods of analysis, and educational values offered to students of another country as quality higher education. Focused academic work in the right institution abroad can prepare students for advanced study or honors work in the final semesters back in Ithaca.

Many students go abroad to pursue work in their majors. Economics and government majors get new views of the European Union or Japan through study at the London School of Economics, the University of Geneva, or the Institute of Political Studies (‘Sciences Po’) in Paris. Biology and chemistry majors have carried their research interests to Oxford, England, the University of Hamburg in Germany, and the University of New South Wales in Australia.

Some students pursue an informal minor to complement the major. For instance, one mathematics major completed a certificate in Dutch studies at Leiden University in the Netherlands. Others combine a premed curriculum with a major in Asian studies enhanced by study in Japan, China, or Nepal. Students with majors in the traditional disciplines can often complete a second major in the interdisciplinary study of a particular region through approved study abroad.

The college advocates study abroad that enables students to become competent enough in another language to experience daily life, develop social relationships, and accomplish formal course work in that language. Students who intend to study abroad in a country where the host language is not English must demonstrate a serious commitment to learning the language through course work before study abroad. At least one area studies course or one course in the history, culture, economics, politics, or social relations of the country of destination should be part of every student’s preparation for study abroad.

Students planning study abroad need solid academic credentials to do so productively and successfully. The college requires a minimum overall GPA of 3.0 for all Cornell course work, and good academic standing in the semester immediately before going abroad.

Study abroad is possible during the sophomore or junior years or during the first semester of the senior year. Study abroad in the final semester is rarely approved. Important steps to prepare for study abroad include:

- substantial progress with college distribution requirements;
- admission to a major and a faculty adviser in the major;
- clear academic agenda for study abroad;
- appropriate study of the country or region of destination, especially language study.

Study abroad can earn up to 15 liberal arts and sciences credits per semester of full-time course work as long as the curriculum abroad is consistent with that of the college. Courses that fall outside the scope of the liberal arts and sciences may earn non-Arts credits. Students must carry a full course load as defined by the host institution. Students may spend up to two semesters abroad. Only those with compelling curricular reasons may study in more than one location over two semesters. The college does not approve study abroad that tours more than one country or that is more touristic than scholarly in content and structure. Students must continue study of the host language while abroad. Only in exceptional circumstances will the college approve programs which, in non-English speaking countries, provide no language training.

All courses taken abroad will appear on the Cornell transcript and grades earned are reported in the system of the host institution. Grades earned through course work abroad do not become part of the Cornell GPA, because grades at other institutions are rarely equivalent to grades at Cornell.

Students who transfer to Cornell must complete a semester of residence on campus in Ithaca and may not study abroad during one of those four semesters.

Applications to study abroad must have the support of a faculty adviser in the major and the approval of the college. Although students apply to study abroad through the Cornell Abroad office, Arts and Sciences applicants submit to the college an essay describing the academic rationale for study abroad and an outline of prospective courses abroad. Students planning study abroad must consult their faculty advisers and Barbara Lantz, assistant dean for International Programs, 55 Goldwin Smith.

Summer Residential Programs in Archaeology

During the summer months students may participate in a Cornell-sponsored archaeo-

logical program. In recent years the program has organized archaeological projects in New York State, Central America, Greece, and Italy. Students should contact the Archaeology Program for information about the sites currently available.

Marine Science

Shoals Marine Laboratory is a seasonal field station that offers a variety of courses and

experiences designed to introduce undergraduates to the marine sciences. The laboratory is located on Appledore Island, six miles off the Maine/New Hampshire coasts. Students should contact the Division of Biological Sciences for further information.

Cornell-in-Washington

The Cornell-in-Washington program offers students from all colleges within the university an opportunity to earn full academic credit for a semester in Washington, D.C. Students take courses from Cornell faculty, conduct individual research projects, and work as externs. The Cornell-in-Washington program offers two study options: 1) studies in public policy, and 2) studies in the American experience. The program also offers a unique externship opportunity: students serve as externs in a federal agency, congressional office, or non-governmental organization and take part in a public policy or humanities seminar. They define and carry out individual research projects under the supervision of Cornell faculty. Potential externships are arranged through, and approved by, the Cornell-in-Washington program. For further information, see p. 19 or inquire at 131 Sage Hall, 255-4000. Seniors who wish to study in Washington during their final semester must petition the college for permission to do so; they should first consult with the dean for seniors, Academic Advising Center, 55 Goldwin Smith Hall, 255-5004.

Fieldwork

Sometimes it is appropriate for students to include fieldwork as part of their major. A three-member faculty committee helps the student plan the project, arranges for ongoing supervision, and evaluates the project at the end of the term. Fieldwork almost always involves writing a long paper or several short ones, as well as practical experience. All proposals for fieldwork must be presented in advance to the Committee on Academic Records for approval. A maximum of 15 credits in fieldwork may be earned.

For further information students should contact an advising dean in the Academic Advising Center, 55 Goldwin Smith Hall.

ADVISING

The following advisers and offices provide academic advising or information on college procedures and regulations.

Faculty Advisers

All new students are assigned a faculty adviser. The adviser helps students design programs of study and advises them about ways to achieve their academic goals. Advisers and new advisers meet first during orientation week to plan the student’s program. New students are encouraged to see their advisers again early in the term before it is too late to drop courses, to discuss their academic program and to become better acquainted. Academic difficulties may frequently be solved or avoided if students and advisers recognize problems early. Advisers and advisers meet at least once each semester to discuss courses for the following term.

Students who would like to petition for an exception to college rules should discuss the matter with their advisers.

Advisers may also help students with study or personal problems or may direct them to other offices on campus where help is available.

Student Advisers

Each new student is supplied with a list of student advisers who can provide information about the college’s requirements, courses, and instructors and about life at Cornell.
Major Advisers
After acceptance into a major, students are assigned a major adviser, a faculty member in the major department, with whom they make many of their most important academic decisions at Cornell. The adviser eventually certifies the completion of the major. The major adviser should be consulted by the student about all academic plans, including honors, study abroad, acceleration, and graduate study. The adviser's support is especially important if a student petitions for an exception to the requirements for the degree.

Academic Services
The Academic Advising Center, 55 Goldwin Smith Hall, 255-5004, the Office of Admissions, 172 Goldwin Smith Hall, 255-4833, and the Office of the Registrar, M46 Goldwin Smith Hall, 255-5051, offer resources for faculty and student advisers and for students themselves and their parents. Advising deans are available to help students define their academic and career goals and to help with special academic options and exceptions to college rules:
Lynne S. Abel, associate dean for undergraduate education, independent majors and College Scholars—255-5004
Patricia M. Dougherty, college registrar—255-5051
Thak Chaloemtirana, associate dean, dean for seniors—255-4833
John Chimient, assistant dean for freshmen—255-5004
Gerry Cox, assistant dean, pre-law adviser, and coordinator of outside scholarships—255-4833
Michele Crane, associate registrar—255-5051
Daniel H. Evett, coordinator of international admissions and academic administrator, Language House—255-6543
Ken Garbad, assistant dean and adviser for internal transfer students—255-4833
Barbara Jo Lantz, assistant dean for study abroad and international programs—255-5004
Steve Sarzydar, assistant dean for mid-year freshmen and dual-degree students—255-4833
Maria S. Terrell, assistant dean for sophomores and juniors—255-5004
Janice Turner, assistant dean for minority programs and premedical adviser—255-5004
Peggy Walbridge, assistant dean for transfer students—255-4833
Marilyn Williams, assistant dean for undergraduate research, scholastic development and Career Center liaison—255-5004

Enrollment in Courses in the College of Arts and Sciences
Students must enroll in courses through the Office of the Registrar, M46 Goldwin Smith Hall.

New Students
During orientation week the dean for freshmen and the dean for transfer students conduct briefings about scheduling courses for new students.

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 those they most want. Students may schedule up to five courses during the course enrollment (preregistration) period. Information and materials will be available in the Office of the Registrar, M46 Goldwin Smith Hall. Before signing into courses, students should make appointments with their faculty advisers to plan their programs. Course enrollment (preregistration) is the best time to discuss long-range goals with faculty advisers. Students who do not have major advisers must submit an academic plan, approved by their faculty adviser, with their proposed schedule. All students are welcome to discuss programs and plans with an advising dean in the Academic Advising Center, 55 Goldwin Smith Hall, or in the Office of Admissions, 172 Goldwin Smith Hall.

Continuing students receive their course schedules at university registration. In the fall they also receive a copy of their transcript and a record of their progress toward the degree, which show the courses taken, grades received, graduation requirements fulfilled, and academic actions. These are not official transcripts, but they reflect the official record and should be corrected in the college registrar's office if they are incorrect.

Limits on Courses and Credits
To meet the 34-course requirement, students must normally take four courses during each of six semesters and five courses during each of two semesters. To meet the 120-credit requirement, students should average 15 credits per semester. (AP credit and/or summer credits may reduce these numbers.) At a minimum, students must carry twelve credits per semester, if for compelling personal or academic reasons students need to carry fewer than twelve credits, they should consult their faculty adviser and an advising dean. Permission is by petition only, it is relatively freely given for first-semester students. Completion of fewer than twelve credits without permission results in unsatisfactory academic standing. First-term freshmen must petition to register for more than eighteen credits, other students may register for more than eighteen credits a term only if their previous term's average was a B or higher. No more than twenty-two credits may be taken in a regular semester without permission of the Committee on Academic Records. Students who fail to seek approval for excess credits from the committee run the risk of having only 18 credits for the semester count toward the degree.

Adding and Dropping Courses
After course enrollment (preregistration), students may not adjust their schedules until the new term begins. During the first three weeks of the semester, students may change courses without petition. Add/drop forms are available in the Office of the Registrar, M46 Goldwin Smith Hall. After the third week of classes, students may petition to add courses. They may drop courses up to the seventh week. Between the seventh and twelfth weeks students may petition to withdraw from courses, if (1) the instructor approves; (2) the adviser approves, (3) no issue of academic integrity is at stake and (4) the student has been attending classes and is up to date in all coursework. Students petitioning to withdraw from a course after the seventh week of the term must meet with an advising dean.

Courses dropped after the seventh week will be noted on the transcript by a "W" where the student's transcript, suspension, or dismissal.

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 students do so, but students must arrange to make up examinations or other work with their instructors. When students will be absent because of religious holidays or athletic competitions, they must discuss arrangements for making up their work with their instructors. Students who must miss an examination must contact the professor in advance. Alternative arrangements are at the discretion of the instructor.

Registration and Course Scheduling
Registration with the University
All students must register with the university at the beginning of each semester. Students may register if they are academically eligible and have paid their tuition. Registration materials are available at a time and place announced each term by the university registrar.

Any student who is not officially enrolled in a schedule of courses by the end of the third week of classes may be withdrawn from the college.

Forgery on Forms
Forging signatures or credentials on college forms is an academic offense; sometimes it constitutes academic fraud. In all cases of forgery on academic forms, the effect of the forgery is an academic offense; sometimes it constitutes academic fraud. In all cases of forgery on academic forms, the effect of the forgery is an academic offense; sometimes it constitutes academic fraud. In all cases of forgery on academic forms, the effect of the forgery is an academic offense; sometimes it constitutes academic fraud.
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** impose no conditions concerning reentering the college except for the five-year limit. Readmission is automatic upon written request made at least one month before the beginning of the term in which the student wishes to return.

2) **Medical leaves** are granted by the college only upon recommendation by a physician from Gannett Health Center. Such leaves are granted for at least six months and up to five years with the understanding that the student may return at the beginning of any term after the medical condition in question has been corrected. In some cases students must satisfy the Gannett Health Center that the condition has been corrected before they may return. The student's academic standing will also be subject to review at the time of the leave and on return.

3) **Conditional leaves** may be granted if the student is not in good standing or, in unusual circumstances, after the seventh week of the term. Normally students may not return from conditional leaves for at least two terms or until specific and individual conditions, such as completing unfinished work, have been met.

4) **Required leaves**: The Committee on Academic standing may require a leave of absence if a student is not making satisfactory progress toward the degree. See the section "Academic Actions." Any student who wishes to take a leave of absence should consult an advising dean in the Academic Advising Center. On readmission, the student's graduation date will be recalculated according to the number of terms completed, the number of acceptable credits earned toward the degree, and the requirements for graduation.

Students who take courses elsewhere while on leave may petition to have credits transferred, provided the 120 credits needed for graduation, but not the 100 credits required in the college. Approval depends on the judgment of the relevant departments and acceptable grades. Credits earned during a leave do not count toward the eight semesters of residence unless a student petitions successfully to accelerate. See the section "Residence." Credits earned during a required leave may not be used to reduce the terms of residence.

**Withdrawals**

A withdrawal is a voluntary severance of connection with the university. If a student wants to withdraw after registering for the term, the withdrawal must be requested before the end of the seventh week of classes to avoid grades of "W" on the transcript. A notation of "W" will appear on the transcript for any course dropped after the seventh week. On withdrawal it is assumed that the student will not reregister in the college. Students seeking readmission after withdrawing from the college must write to the Committee on Academic Records for permission. If a student fails to register for a term and does not request a leave, the student will be withdrawn from the college for failure to register.

**Transferring within Cornell (Internal Transfer)**

Internal transfer from one college or school at Cornell into another is attractive for many students whose intellectual interests change. Students who want to transfer should discuss their eligibility with a counselor at the new school or college.

In some cases students who want to transfer into the College of Arts and Sciences may transfer directly. In other cases they may be referred to the Internal Transfer Division. During the term immediately preceding transfer into the College of Arts and Sciences, students should complete at least 12 credits of courses in the College of Arts and Sciences with superior grades and without any grades of "Incomplete," any S-U grades (unless only S-U grades are offered for that particular course), or any grades below C. Satisfying this minimum requirement does not, however, guarantee admission. Admission to the college is based on consideration of the student's entire record at Cornell and the high school record, not just the work of one student. Interested students should see Assistant Dean Gabard, in Arts and Sciences Admissions, 172 Goldwin Smith Hall.

**ACADEMIC STANDING**

Students are in good academic 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 or no F or U grades. If a student completes only three courses, all grades must be above D. In addition, students are expected to make satisfactory progress toward satisfying requirements for the degree, and to earn grades of C (not C-) or better in at least 100 of the total credits for the degree. See also "Noncredit courses," above, under "Courses and Credits."

**Application to Graduate**

In the first semester of their senior year, students must complete an application to graduate so that the college can check each student's plan for fulfilling college requirements. This process is intended to help seniors identify problems early enough in the final year to make any necessary changes in course selection to satisfy those requirements. Meeting graduation requirements is the student's responsibility; problems that are discovered, even late in the final term, must be resolved by the student before the degree can be granted. Seniors will receive applications and instructions in their packets at college registration.

**Degree dates.** There are three degree dates in the year: May, August, and January. Students who plan to graduate in August may attend graduation ceremonies in the preceding May. Students graduating in January are invited to a special recognition ceremony in December; they may also attend graduation ceremonies in the following May. The degree: The College of Arts and Sciences grants the A.B. (or B.A.) degree. A.B. is the abbreviation of the Latin name for the degree: "Artium Baccalaurus," or translated into English, B.A.: "Bachelor of Arts."

**Honors**

**Dean's List**

Inclusion on the Dean's List for academic excellence is an honor accorded by the dean of the college. The criteria are subject to change from semester to semester and are available in the Office of the Registrar, M46 Goldwin Smith Hall.

**Bachelor of Arts with Honors**

Almost all departments offer honors programs for students who have demonstrated exceptional ability in the major and who seek an opportunity to explore branches of their subject not represented in the regular curriculum or to gain experience in original research. The honors programs are described by individual departments in the following sections. The degree of Bachelor of Arts with honors will be conferred upon students who, in addition to having completed the requirements for the degree of Bachelor of Arts, have satisfactorily completed the honors program in their major and have been recommended for honors by their major department, the Independent Major Program, or the College Scholar Program. Concentrations do not offer honors programs.

**Bachelor of Arts with Distinction**

The degree of Bachelor of Arts with distinction in all subjects will be conferred on students who have completed the requirements for the degree of Bachelor of Arts, if they have met the following requirements by the end of their final semester:

1) completed at least 60 credits while registered in regular sessions at Cornell;
2) ranked in the upper 30 percent of their class at the end of their seventh semester, or next-to-last semester for transfers and accelerants;
3) received a grade below C in no more than one course;
4) received no failing grade;
5) maintained good academic standing, including completing a full schedule of at least 12 credits, in each of their last four terms; and
6) have no Incompletes remaining on their records.

**Failure to Maintain Good Academic Standing**

Students are not in good academic standing if they complete fewer than 12 credits; receive more than one D, or one D in a schedule with only three courses, or any F or U grades; if they have not made satisfactory overall progress in grades or credits (whether due to failures or incompletes) or in the requirements of the college or the major. Such students will be considered for academic action by the Committee on Academic Records or one of the deans of the college.

**Academic Actions**

**Warning.** Any student who fails to maintain good standing will, at a minimum, be warned. The warning may be given by an advising dean in the college or by the Committee on Academic Records. A warning is posted on a student's unofficial college transcript but is not reported to the university registrar and does not appear on official transcripts.
Required leave of absence. A student in serious academic difficulty may be required by the Committee on Academic Records to take a leave of absence, normally for a full year. Usually, but not necessarily, the Committee on Academic Records warns students before suspending them. Before being allowed to return and reregister in the college, students must submit a plan for completing the degree. In some cases the students will be required to furnish evidence that they are ready to return before being allowed to reregister in the college. Students who request to return in less than a year must present to the committee exceptionally strong evidence of their readiness to return. “Required leave” and the date are posted on the student’s transcript.

Required withdrawal. The Committee on Academic Records may dismiss a student from the college because of a highly unsatisfactory record for one term or for failure to make satisfactory overall progress in grades, credits, or the requirements of the major. This action expels the student permanently from the college. “Required withdrawal” and the date are posted on the student’s transcript. Students being reviewed for academic action are urged to present evidence that will help explain their poor academic performance. Students may appeal a decision or action of the committee if they have new relevant information to present.

### GRADES

#### Letter Grades
See Grading Guidelines, page 12.

#### S-U Grades
The S-U (satisfactory-unsatisfactory) option allows students to explore unfamiliar subjects or take advanced courses in relatively new subjects without being under pressure to earn high grades. It is not meant to reduce the amount of work a student completes in a course or the amount of effort a student devotes to a course. Students must select their grading option during the first three weeks of the term (virtually no exceptions to this deadline are permitted), although the S-U option is contingent upon the instructor’s willingness to assign such grades. A grade of S is equivalent to a grade of C- or higher; a grade of U, which is equivalent to any grade below C-, is a failing grade equal to an F. S means the student receives the credit specified for the course. U means no credit is given. A few courses in the college are graded exclusively S-U; in that case, the final grade appears on the transcript as SX or UX.

Courses that will count toward satisfaction of major requirements should not be taken for an S or U grade unless the department grants permission. Students may elect the S-U option in courses used to satisfy the distribution, language, and elective requirements, provided that such courses do not also count toward major requirements or serve as prerequisites for admission to the major. Students are advised to use the S-U option sparingly if they intend to apply to graduate school or for transfer to another college. There is no limit on the number of courses each term for which students may elect the S-U grade, but within the 120 credits required for the degree, a minimum of 80 credits must be in courses for which a letter grade was received.

### Grades of Incomplete
A grade of incomplete signifies that a course was not completed before the end of the term for reasons beyond the student’s control that are acceptable to the instructor. Students must have substantial equity in the course; that is, they must be able to complete the remaining work without further registration and must have a passing grade for the completed portion. When a grade of incomplete is reported, the instructor submits a form stating what work must be completed, when it must be completed, and the grade earned if the work is not completed by that date. When a final grade is reported, it is recorded on the official transcript with an asterisk and a footnote explaining that this grade was formerly an incomplete.

Students must resolve any incompletes with their instructors before graduation.

#### R Grades
R designates two-semester or year-long courses. The R is recorded on the student’s transcript at the end of the first term. The grade recorded at the end of the second term evaluates the student’s level of performance in the course for the entire year. The total of credits earned for the whole course is 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.

#### Class Rank
The college does not compute class rank.

### CALENDAR SUPPLEMENT
All of the dates in the university calendar at the front of this volume apply to all Cornell students. Listed below are some additional dates that are of importance for students in the College of Arts and Sciences.

<table>
<thead>
<tr>
<th>Fall 1995</th>
<th>Spring 1996</th>
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<tr>
<td>First deadline for submitting independent major requests. Go to Academic Advising Center, 55 Goldwin Smith Hall, for further information.</td>
<td>Sept. 25</td>
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<td>Last day for adding courses without petition.</td>
<td>Feb. 26</td>
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<td>Last day for changing grade option to S-U or letter.</td>
<td>Sept. 22</td>
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<tr>
<td>Second deadline for submitting independent major requests. Go to Academic Advising Center, 55 Goldwin Smith Hall, for further information.</td>
<td>Feb. 9</td>
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<td>Nov. 27</td>
<td>April 1</td>
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<td>Dec. 1</td>
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<td>Nov. 17</td>
<td>April 19</td>
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<td>Oct. 20</td>
<td>March 8</td>
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<tr>
<td>Deadline for applying to study abroad.</td>
<td>See Cornell Abroad, 474 Uris Hall</td>
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<tr>
<td>Course enrollment (pre-registration) for the following term (tentative).</td>
<td>Oct. 18–Nov. 1</td>
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<tr>
<td>Last day to petition to drop a course.</td>
<td>April 10</td>
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<td>April 24</td>
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### ADMINISTRATION

Philip Lewis, acting dean — 255-4146
Elizabeth Adkins-Regan, associate dean — 255-4147
Peter Kahn, associate dean — 255-4147
Lynne S. Abel, associate dean for undergraduate education — 255-3386
Thak Chaloemtiarana, associate dean and director of admissions — 255-7061
Jane V. Pedersen, director of administration and finance — 255-7507

### Courses and Departments

#### SPECIAL PROGRAMS AND AREAS OF CONCENTRATION
The college offers a number of interdisciplinary programs described in the section following the departmental program descriptions.

#### AFRICANA STUDIES MAJOR
See "Special Programs and Interdisciplinary Studies."

#### AKKADIAN
See Department of Near Eastern Studies.

#### AMERICAN STUDIES
See "Special Programs and Interdisciplinary Studies."
ANTHROPOLOGY


Antropology is unique in that it takes humanity in its broadest sense as its subject matter. It is a discipline that stresses the world’s cultural diversity by means of a comparative perspective. This means that anthropologists are interested in cultural differences in and among modern societies, as well as exchange over time and the evolutionary history of our species. As we look ahead to the twenty-first century, anthropology prepares students to think globally about human kind as thinkers, actors, builders, and as living organisms in a complex and fragile ecosystem.

The three branches of anthropology are archaeology, biological anthropology, and sociocultural anthropology. Archaeologists collect and interpret the record of the past to extend our understanding of human history and social change. That record tells the story not only of “ancient” societies, but also of the rise of civilizations that were the direct forebears of the contemporary nations that we know today. Archaeology also tells the story of human origins, the invention of farming and settled life, the rise of complex social institutions and technologies, and the worldviews of the past, among other themes. Biological anthropologists focus on the natural history of our species. This involves the study of human anatomy, genetics, nutrition, and ecology. In addition, study of our phylogenetic cousins, nonhuman primates, and our fossil record helps biological anthropologists study the diversity of behaviors, social relationships, economies, political and legal orders, worldviews, languages, symbols, myths, and religions—among the many other means human beings invent to create and reproduce a life around the world. Sociocultural anthropologists collect data primarily through ethnographic fieldwork, that is, months or years of participating and observing in the societies they study.

Together, the three branches of the discipline offer an integrated approach to the immense diversity of human experience. Through its subject matter, theories, and methods, anthropology also offers students a chance to integrate the three divisions of the university: the humanities, social sciences, and natural sciences. Each branch of anthropology involves these three subject areas in different ways. For purposes of distribution requirements in the College of Arts and Sciences, most courses in anthropology satisfy the social science requirement and the requirement for geographic and cultural breadth. Some anthropology courses also fulfill the biological sciences requirement or the requirement for historical breadth.

The major is designed to offer students opportunities to study all three branches of anthropology through courses on particular topics (e.g., agriculture, religion, or economics), on world areas, and on theoretical problems. The requirements for majors are outlined below. Within the major, students may design their own specialties in consultation with a faculty adviser. Specialties may be developed through any combination of 300- and 400-level courses in the department, independent study, courses in related fields, and honors work.

The Major

1) The major in anthropology requires completion of Anthropology 101 and 102. Preferably, these courses will be taken in the freshman or sophomore years.

2) Students who major in anthropology:

a) Take at least one course at the 200 level or above in each of categories III, IV, V, VI, and VII from the listing below. In satisfaction of this requirement, no course may be used to fulfill more than one category.

b) Develop one or more areas of specialization within the discipline in consultation with his or her faculty adviser. Examples of such specializations might include sociocultural anthropology, archaeological anthropology, theoretical and history, and biological anthropology.

c) Take a total of 32 credits of course work above the 100 level. Up to 8 credits of course work in cognate disciplines related to the student’s specialization may be accepted for the major with the permission of the faculty adviser.

d) When appropriate, special provisions for meeting major requirements may be arranged with the faculty adviser’s approval.

Honors. Honors in Anthropology are awarded for excellence in the major, which includes overall grade point average and completion of an Honors Thesis. Anthropology majors interested in the Honors Program should consult the chair of the Honors Committee at the end of their junior year. To qualify for the Honors Program, a student must have at least a 3.2 grade point average, and the consent of a faculty member in anthropology who will guide the honors thesis. After applying for the program and being admitted as a candidate by the Honors Committee, the student will conduct original research and write a publishable-quality thesis. This thesis will be evaluated by the faculty research adviser and two other faculty members. Honors (i.e., cum laude, magna cum laude, or summa cum laude) are awarded based on the quality of the thesis and the student’s overall record. While working on the thesis during the senior year, students may enroll in Anthropology 491 (fall) and/or 492 (spring) for credit. The credits are variable and grades for these courses are given by the faculty research adviser and based on performance during thesis research and writing.

Facilities. The biological anthropology laboratory (McGraw 303) houses an extensive collection of materials for teaching purposes, including: 1) human skeletal remains, 2) articulated skeletons and cranial casts of strepsirhine primates, 3) articulated monkey skeletons, 4) casts of ape crania and postcrania, 5) casts that demonstrate the human fossil record including early nonhuman primate ancestors, the Australopithecines, and members of our genus Homo. In addition, the department has an extensive collection of archaeological and ethnological materials housed in the Anthropology Collections.

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 and supervision of a faculty member. 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.

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

I. Introductory Courses

Note: For additional freshman writing seminars in anthropology, see “Freshman Writing Seminars” and the John S. Knight Writing Program’s special brochure.

ANTHR 101 Introduction to Anthropology: Biological Perspectives on the Evolution of Humankind

Fall. 3 credits. M. Small. The evolution of human kind is explored through the fossil record, studies of the biological differences among current human populations, and a comparison with our closest relatives, the primates. This course investigates the roots of human biology and behavior with an evolutionary framework.

ANTHR 102 Introduction to Anthropology: The Comparison of Cultures

Spring. 3 credits. Staff. An introduction to cultural anthropology through ethnographies, or the descriptive accounts of anthropologists. Through readings and lectures students acquaint themselves with a number of cultures from several parts of the world. The cultures range in form from those of small-scale tribal societies to those of complex, modern-day states. Throughout the course we attempt to make sense of exotic cultures in their own terms. Attention is focused on variation in cultural patterns as they are expressed in social, economic, and ritual practices. In this encounter the principles of anthropology, as a comparative enterprise that poses distinct cultural systems in relief, will be developed. Fiction, films, and exercises supplement the formal anthropological materials.

ANTHR 103 The Scope of Anthropology

Spring. 1 credit. Prerequisite: concurrent enrollment in or prior completion of Anthropology 101 or Anthropology 102. S/U grades only. Staff. This course is intended for majors in anthropology, prospective majors. Each week a different member of the faculty in anthropology at Cornell will make a presentation on the nature of their work within the field and discuss their interests with students. The course is meant to introduce the range of approaches found within anthropology and help students in planning future course work.
ANTHR 200 Cultural Diversity and Contemporary Issues (also HASP 200) @
Fall. 3 credits. J. Borneman.
This course will introduce students to the meaning and significance of forms of cultural diversity for the understanding of contemporary issues. Drawing from films, videos, and selected readings, students will be confronted with different representational forms that portray cultures in various parts of the world, and they will be asked to examine critically their own prejudices as they influence the perception and evaluation of cultural differences. We shall approach cultures holistically, assuming the inseparability of economies, kinship, religion, and politics, as well as interconnections and dependencies between world areas (e.g., Africa, Latin America, the West). Among the issues considered: "political correctness" and truth; nativism and ecological diversity; race, ethnicity, and sexuality; sin, religion, and war; global process and cultural integrity.

II. Courses Intended Primarily for Majors

ANTHR 491 Honors Thesis
Fall. Credit and hours to be arranged. Prerequisite: consent of the Honors Committee. Intended for majors graduating in mid-year. Staff. Independent work under the close guidance of a faculty member selected by the student.

ANTHR 492 Honors Thesis
Spring. Credit and hours to be arranged. Prerequisite: consent of the Honors Committee. Staff. Independent work under the close guidance of a faculty member selected by the student.

ANTHR 497-498 Topics in Anthropology
497, fall; 498, spring. Credit and hours to be arranged. Intended for undergraduate students only. Staff. Independent reading course in topics not covered in regularly scheduled courses. Students select a topic in consultation with the faculty member who has agreed to supervise the course work.

III. Archaeological Courses
See also courses listed under Archaeology.

[ANTHR 202 Interpretive Archaeology (also ARKEO 202)
Fall. 3 credits. Not offered 1995-96.]

ANTHR 203 Early People: The Archaeological and Fossil Record (also Archaeology 203)
Fall. 3 credits. T. P. Volman. For course description, see ARKEO 203.

ANTHR 204 Ancient Civilizations (also Archaeology 204) @
Fall. 3 credits. J. S. Henderson. An introduction to the archaeology of early civilizations, especially in Mesopotamia, Egypt, India, China, Mexico, and Peru. Emphasis is on the emergence of the first complex societies and their key institutions (the state, kingship, cities, markets, writing, among others). The nature of complex societies and strategies for investigating them archaeologically are considered as general issues.

[ANTHR 317 Stone Age Archaeology (also Archaeology 317)
Fall. 4 credits. Not offered 1995-96.]

IV. Biological and Ecological Anthropology

ANTHR 275 Human Biology and Evolution (also Biological Sciences 275 and Nutritional Science 275)
Fall. 3 credits. K. A. R. Kennedy. For course description, see BIOES 275.

[ANTHR 371 Human Paleontology (also Biological Sciences 371)
Fall. 4 credits. Not offered 1995-96.]

[ANTHR 390 Primate Behavior and Ecology
Spring. 4 credits. Not offered 1995-96.]

[ANTHR 474 Laboratory and Field Methodology in Human Evolution (also Biological Sciences 474)
Spring. 5 credits. Not offered 1995-96.]

[ANTHR 490 Primates and Evolution
Spring. 4 credits. Limited to ten students. Prerequisite: Anthropology 390 or permission of instructor. M. F. Small.]

This seminar will focus on one current controversy in primatology. Through readings and discussion the issues will be subject to critical examination. Current topics might include: social intelligence, primates as predators and prey, primate conversation, sexual selection theory, reproductive success, dominance, etc.

V. Sociocultural Anthropology

ANTHR 211 Nature and Culture @
Spring. 4 credits. T. P. Volman. Cultural anthropology, because it encompasses the comparative study of humankind in society, provides a unique vantage on the nature of humanity. One of the focal questions of the discipline is the relationship between the physical/biological and symbolic/moral worlds in which we live. This inquiry places anthropology squarely at the center of social theory, as all social theories and political ideologies are founded on premises regarding human nature. Through study of a variety of issues and debates (e.g., "sociobiology," the origin and meaning of the incest tabu), this course examines a variety of past and current attempts to explain the relationships between nature and culture in human life.

ANTHR 217 Ethnicity, Identity, and the State
Spring. 4 credits. D. J. Greenwood. Center on how the handling of rights, distributive justice, and public policy in different political/legal systems link to very different expressions of ethnic identity, cooperation, and conflict. The core of the course is a comparison of the United States and Spain in the handling of ethnic identity and the consequences of different ways ethnic groups develop. The complex role of anthropology in these processes in different countries is examined in detail.

ANTHR 290 Filming Other Cultures (also Theatre Arts 290) @
Spring. 3 credits. Limited to 20 students. Preferences given to students who have taken either Anthropology 102 or Theatre Arts 274. Fee for film screening and maintenance, $35. R. Ascher. Shortly after the first films were screened, their makers saw in motion pictures a promise for greater understanding among peoples. Was the promise fulfilled? Responses to this question are examined through films and related readings, leaving ample time for discussion and the development of a critical vocabulary. The frame of reference includes: film theory, history, criticism, aesthetics and ethics; changing notions of "otherness"; the emergence of a global film culture.

ANTHR 305 Emotion, Gender, and Culture (also Women's Studies 305) @
Fall. 4 credits. B. J. Isbell. This course introduces students to the current anthropological perspective on the following topics: (1) cultural shaping of emotion, (2) acquisition and production of gender and sexuality, and (3) an historical perspective on cross-cultural studies of psychology and cognition. It is appropriate for students majoring in anthropology, women's studies, psychology, cognitive studies, and human development and family studies.

[ANTHR 306 Ethnographic Description
Fall. 4 credits. Not offered 1995-96.]

This seminar will focus on one current controversy in primatology. Through readings and discussion the issues will be subject to critical examination. Current topics might include: social intelligence, primates as predators and prey, primate conversation, sexual selection theory, reproductive success, dominance, etc.
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 cultures are emphasized.

ANTHR 320 Myth, Ritual, and Symbol @
Spring. 3 or 4 credits. Not offered 1995–96.

ANTHR 321 Sex and Gender in Cross-Cultural Perspective (also Women's Studies 321) @
Fall. 4 credits. K. S. March.
An introduction to the study of sex roles 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, ideologi cal, and biological systems to emphasize the diversity in gender and sex-role definition around the world.

ANTHR 322 Magic, Myth, Science, and Religion (also Religious Studies 322) @
Fall. 3 credits (4 by arrangement with instructor). Limited enrollment. A. T. Kirsch.
Surveys various classic anthropological perspectives on the role of religion as a cultural system in human life. Magic, myth, and ritual as cultural markers of and solutions to endemic contradictions, tensions, and transitions are explored. We will ponder the role of science as cultural system and the present state and future prospects for religion in the "modern" and "post-modern" world.

ANTHR 323 Kinship and Social Organization @
Spring. 4 credits. 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 its fate in urban communities.

ANTHR 325 Economic Anthropology @
Fall. 4 credits. Not offered 1995–96.

ANTHR 328 Conflict, Dispute Resolution, and Law in Cultural Context @
Spring. 4 credits. V. Santiago-Itirazry.
Rule-making and dispute resolution are integral aspects of social reality in any culture. The ways in which conflict is treated and interpreted—to be then deflected or resolved—articulate with other cultural domains such as religion, politics, and economics as part of the material and symbolic processes that enable sociocultural interaction. At issue then are the formal and processual means that the treatment of conflict takes in different societies. These means constitute frames for the definition of social experience that are used by social actors in the interpretation of events within the terms of an overriding sociocultural logic that is in turn refashioned by these interpretive frames.

ANTHR 329 Indigenous Rights, Contemporary Hunter-Gatherers, and the Nation-State @
Fall. 4 credits. Not offered 1995–96.

ANTHR 332 Culture and Performance, and Performing Culture @
Fall. 4 credits. B. J. Idee.
This course has two goals: 1) to examine the anthropology of non-western cultural performances such as: the Japanese tea ceremony, rites of passage, curing and initiation ceremonies in diverse cultures, and 2) to "perform anthropology" through dramatic readings of epic poems, myths, and experimental plays. The course will focus on diverse materials from Latin America, Asia, and Africa.

ANTHR 362/662 Democraticizing Research: Participation, Action, and Research @
Fall. 4 credits. D. J. Greenwood.
A fundamental critique of orthodox social science, the course argues for action research as a combined scientific and social reform strategy. The major varieties and core methods of participatory action research are presented. NOTE: the graduate student option is available through the presentation of participatory action research project proposals, in addition to the regular required work of the course.

ANTHR 380 State, Nation, and Everyday Life @

ANTHR 385 Sex, Morality, and the Law @
Fall. 4 credits. Not offered 1995–96.

ANTHR 400 The Craft of Anthropology: Ethnographic Field Methods @
Fall. 4 credits. Permission only. V. Santiago-Itirazry.

ANTHR 406 The Culture of Lives (also Women's Studies 406) @
Spring. 4 credits. K. S. March.
This seminar will look at persons, lives, cultures, and methods in anthropological life history materials. Throughout the seminar we will attend to the evolution of interest in, forms of, and uses for life history materials in anthropology, with special attention to differences in women's and men's lives and life (re)presentations.

ANTHR 408 Gender Symbolism (also Women's Studies 408) @

ANTHR 417 Person, Gender, and Song (also Women's Studies 416) @

ANTHR 424 Anthropology Amongst the Disciplines @
Fall. 4 credits. J. T. Siegel.
Anthropology is distinguished amongst the disciplines in depending on a notion of the not-yet conceptualized, the encounter with which is thought to provide an inassimilable element into thinking about culture and society. The course provides a history and assessment of the current course of this field and its embodiment, particularly in studies of ritual.

ANTHR 428 Spirit Possession, Shamanism, Curing, and Witchcraft (also Women's Studies 428) @

ANTHR 436 Language, Culture, and Society @
Fall. 4 credits. Not offered 1995–96.

ANTHR 439 Culture and Power @
Fall. 4 credits. Not offered 1995–96.

ANTHR 441/625 Children, Literature, and Society (also Asian Studies 451/625) @
Fall. 4 credits. Not offered 1995–96.

ANTHR 451 Anthropological Boundaries @
Fall. 4 credits. Not offered 1995–96.

ANTHR 452 Portraits, Profiles, and Life Histories @

ANTHR 453 Visual Anthropology @
Fall. 4 credits. Prerequisite: permission of instructor. Enrollment limited by appropriate space for showing work. S-U grades only. Fee for film screening and refreshments, $20. M. Trumper.
The expression of ideas about the human condition through original drawings, graphics, paintings, photographs, cinema, sculpture, and video that take the person as subject. Writing can be combined with visual expression, as, for example, In concrete poetry or photographic essays. Projects must conform to two general guidelines: (1) the student must have prior knowledge of the medium chosen or concurrent course work in it, and (2) the project must be one that can be developed throughout the course and benefit from its particular setting. In the first half, the creative work of others is studied. For example, we read Spiegelman's Maus and view films made by both anthropologists and the people whom they visit. The second half is devoted to hour-long progress reports and discussions of the work of people in the course.

ANTHR 455 Theatre of Anthropology @

ANTHR 460 Culture and International Order @

ANTHR 470 Anthropology, Theory, Politics, Performance (also Government 470) @
Fall. 3 credits. V. Santiago-Itirazry.
S. Buck-Moors.
An analysis of written and visual tests that expose the rough edges of interpretive coherence and question the self-evidence of knowledge as practice. Topics vary. The stress is on critical methods of reading.

VI. Area Courses

ANTHR 221 Anthropological Representation: Ethnographies on Latino Culture (also HASP 221) @
Spring. 3 credits. V. Santiago-Itirazry.
Representation is basic to anthropology. In translating cultures, anthropologists produce authoritative representations of and about other people's lives. In this course, we will examine, with a critical eye, the production of representations about U.S. Latino cultures as these are embodied in anthropological texts. Issues to be explored include the relation between the ethnographer and the people s/he is studying, the contexts in which ethnographic texts are produced, and the way they may position different cultural groups within the larger national context.

ANTHR 230 Cultures of Native North America @
Fall. 4 credits. B. Lambert.
A survey of the principal Eskimo and American Indian culture areas north of Mexico. Selected cultures will be examined to bring out distinctive features of the economy, social organization, religion, and worldview.
Although the course concentrates on traditional cultures, some lectures and readings deal with changes in native ways of life that occurred during the period of European Indian contact.

ANTHR 332 Ethnology of the Andean Region @
Spring. 4 credits. A. T. Kirsch.
This course will begin with the examination of the consequences of two pressing contemporary issues in the Andes. The Shining Path and the Drug War in Bolivia. Then we will consider a number of anthropological studies on diverse aspects of Andean culture including: economy, social structure, gender, religion as well as cosmology, and astronomy with emphasis on concepts of time, memory and history. The course will conclude with a discussion of the impact of the conquest on the Inka Empire.

ANTHR 335 People and Cultures of Mainland Southeast Asia @
Spring. 4 credits. D. J. Greenwood.
A survey of the peoples and cultures of Mainland Southeast Asia from prehistoric to contemporary times.

[ANTHR 336 Peoples and Cultures of the Pacific @]
Fall. 4 credits. Not offered 1995-96.

ANTHR 339 Peoples and Cultures of the Himalayas @
Spring. 4 credits. K. S. March.
A comprehensive exploration of the peoples and cultures of the Himalayas. Ethnographic materials draw on the lifeways of populations living in the Himalayan regions of Bhutan, India, Nepal, and Tibet. Some of the cultural issues to be examined through these sources include images of the Himalayas in the West, forms of social life, ethnic diversity, political and economic history, and religious complexity.

[ANTHR 343 Religion, Family, and Community in China @]
Fall. 4 credits. Not offered 1995-96.

ANTHR 344 Male and Female in Chinese Culture and Society @
Fall. 4 credits. P. S. Sangren.
This course explores the culture of gender, sex roles, and domestic relations in late traditional and modern Chinese society. Readings and lectures range from ethno­graphic descriptions of the dynamics of Chinese family life, kin relations, and socialization to representations of male and female in mythologies and ritual activities. The course also considers developments subsequent to political changes in China. Although the course's analytical focus is anthropological, readings will draw from the writings of historians and political scientists as well. A premise of the course is that understanding sex and gender in China is essential to understanding Chinese culture and its most fundamental values. The course also aims to introduce students interested in Chinese to techniques of anthropological analysis.

[ANTHR 345 Japanese Society @]
Fall. 4 credits. R. J. Smith.
A survey of the social structure of Japan and a discussion of trends in urban and rural life during the past century. Topics to be emphasized include the family, ancestor worship, community and social organization, and urbanism and modernization.

ANTHR 350 Topics in the Anthropology of Europe
Spring. 4 credits. J. Borneman.
This course explores ways in which Europe can and has been studied anthropologically. Emphasis will be on understanding processes of cultural differentiation and integration. The self-understanding of various peoples of Europe is accounted for in terms of the relation of local culture to national, transnational, and global process. Among the topics to be explored: 1) the role of culture in nation-building; 2) the rise and decline of fascism and communism in the twentieth century; 3) Cold War division and everyday life; 4) the creation and displacement of cultural areas (i.e., the Mediterranean, Scandinavia, Mitteregion, Slavic culture, the West, and the East).

ANTHR 352 The Anthropologies of Spain @
Fall. 4 credits. D. J. Greenwood.
An introduction to the cultures and social history of Spain, the course takes up cultural diversity in Spain, the "Black Legend," and the relationship between home and homeland, and the role of anthropology in contemporary Spain.

[ANTHR 433 Andean Thought and Culture @]
Spring. 4 credits. Not offered 1995-96.

[ANTHR 443 Religion and Ritual in Chinese Society (also Religious Studies 443) @]
Fall. 4 credits. Not offered 1995-96.

[ANTHR 444 Japanese Social Organization @]
Spring. 4 credits. Not offered 1995-96.

[ANTHR 456 Mesoamerican Religion, Science, and History @]
Fall. 4 credits. Not offered 1995-96.

[ANTHR 477 Ethnology of Island Southeast Asia @]
Fall. 4 credits. Not offered 1995-96.

VII. Theory and History of Anthropology
In addition to the courses listed here, Anthropology 390 may also be used to satisfy the theory requirement.

[ANTHR 402 Archaeological Research Design (also Anthropology 402) @]
Spring. 4 credits. Not offered 1995-96.

[ANTHR 404 Approaches to Archaeology @]

ANTHR 412 Contemporary Anthropological Theory @
Spring. 4 credits. B. Lamberti.
A survey of the assumptions anthropologists make concerning the nature of society and culture and the explanations they have proposed for social behavior, values, belief systems, and ritual. Problems of social continuity and change will be addressed by way of theories of process, conflict, and disputation. Problems of cross-cultural understanding will be explored through interpretative and structural studies of symbolism, ritual, mythology, concepts of the person, and cultural logic. Examples will be drawn from Western and non-Western societies, past and present.

ANTHR 420 Development of Anthropological Thought
Fall. 4 credits. A. T. Kirsch.
An examination and analysis of the development of anthropological theory and practice. The course will focus on the differences and continuities among the various national and historical approaches that have come to be regarded as the schools of anthropology.

ANTHR 426 Ideology and Social Reproduction
Spring. 4 credits. P. S. Sangren.
What is the logic of the process that links culture and social institutions? Why do all cultural systems (including "science") embody an element of logical circularity or delusion? How do theories of society, economy, and nature relate to values, authority, power, and legitimacy? Anthropology's comparative perspective on these questions is the focus of this course. Students will read and evaluate analyses of both familiar and exotic societies that focus on the dialectical relationship between ideas and institutions. The course will maintain a critical perspective toward considering theoretical positions (e.g., "structural," "Marxist," "deconstructive," etc.) and encourage attention to the ideological dimensions of critical theory itself.

ANTHR 495 Classic Theorists Seminar
Fall. 4 credits. Not offered 1995-96.

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

ANTHR 600 Special Topics in Feminist Theory: An Examination of Women's Studies (also German Studies 600)
Fall. Not offered 1995-96.

ASIAN 601 Southeast Asia Seminar: To be announced

ASIAN 602 Southeast Asia Seminar: Thailand

ANTHR 604 Praxis and Culture (also Culture 600, Society for the Humanities 415)
Spring. 4 credits. F. Fajans.
This seminar will explore the relations between social and cultural systems and the actors in those systems considered as cultural subjects. The focus will be on the activities and practices that produce both the actor and the context for action. Starting from Marx's concept of praxis, which he defines as the material processes of action, the readings will consider both micro level constructs of cultural forms (such as linguistic forms, schemas, forms of activity, and habits) and macro constructs (such as myth, cosmology, ritual, and social structures, etc.). The course will move between theoretical approaches in anthropology, psychology, sociology, and philosophy.

ANTHR 607-608 Special Problems in Anthropology
607, 608, spring. Credit to be arranged. Intended for graduate students only.

[ANTHR 610 Language of Myth (also Classics 610 and Comparative Literature 615) @]
Spring. 4 credits. Not offered 1995-96.

ANTHR 616 The Cultural Production of the Person (also Society for the Humanities 403) Fall. 4 credits. For description, see S HUM 403.

ANTHR 617 Ritual: Structure, Process, Practice Fall. 4 credits. D. Holmberg. The initial task of this seminar is to trace the history of the anthropology of religion up to the late 1960s when the ideas of Victor Turner, Claude Levi-Strauss, Clifford Geertz and others dominated theoretical work. The seminar will then examine where contemporary theory has taken, if anywhere, studies of ritual and myth.

ANTHR 619 Anthropological Approaches to the Study of Buddhisms in Asia Spring. 4 credits. Not offered 1995-96.

ANTHR 621 Gender and Culture (also Women's Studies 621) Fall. 4 credits. Prerequisite: concurrent attendance in the lectures and films of Anthropology/Women's Studies 321 and permission of instructor. K. S. March. This seminar is intended for advanced students planning further study or research on gender issues and desires of an anthropological perspective on them. It explores the topics, questions, and readings of Anthropology/Women's Studies 321 in greater depth and with attention to the special research interests of the participants each year.


ANTHR 626 Problems in Economic Anthropology Fall. 4 credits. Not offered 1995-96.

ANTHR 628 Political Anthropology Fall. 4 credits. Not offered 1995-96.


ANTHR 630 The Philosophy of Money Fall. 4 credits. Not offered 1995-96.


ANTHR 633 Andean Research Fall or spring. 4 credits. Not offered 1995-96.

ANTHR 634–635 Southeast Asia: Readings in Special Problems 634, fall; 635, spring. Credit to be arranged. Hours to be arranged. Staff.

ANTHR 636 Cognition and Classification Fall. 4 credits. Not offered 1995-96.

ANTHR 637 Anthropological Perspectives on Human Rights, Democracy, and Violence in Latin America Spring. 4 credits. B. J. Isbell. The global community through the U.N. has passed legislation defining universal human rights; however, not all countries subscribe to this legislation, arguing that human rights have to be defined within a cultural and political context. This course examines these issues with examples drawn from four diverse cases: China, Germany, Peru, and Guatemala. Democracy and nationalism are celebrated in various parts of the globe, while other regions are caught in ethnic and other forms of ‘low intensity wars.’ The seminar participants will examine the discourses of democracy and ethnicity through detailed case studies.


ANTHR 640–641 South Asia: Readings in Special Problems 640, fall; 641, spring. Credit to be arranged. Selected readings in society, religion, and culture in South Asia.

ANTHR 644 Research Design Spring. 4 credits. T. Bestor. This seminar focuses on preparing a full-scale proposal for anthropological fieldwork for a dissertation. Topics include identifying of appropriate funding sources; defining a researchable problem; selecting and justifying a particular fieldwork site; situating the ethnographic case within appropriate theoretical contexts; selecting and justifying appropriate research methodologies; developing a feasible timetable for field research; ethical considerations and human subjects protection procedures; and preparing appropriate budgets. This is a writing seminar, and students will complete a proposal suitable for submission to a major funding agency in the social sciences.

ANTHR 645 Japanese Ethnology Fall. 4 credits. R. J. Smith. This seminar is designed for advanced students who plan to conduct social science research in Japan. It deals with questions of historical continuity, the relationship of the individual to society, and the nature of contemporary Japanese social organizations. A reading knowledge of Japanese is strongly recommended.

ANTHR 648 Marriage and Death Fall. 4 credits. Not offered 1995-96.

ANTHR 649 Narrative and the Analysis of Culture Fall. 4 credits. Not offered 1995-96.

ANTHR 651 Anthropological Boundaries: Seminar on Film Spring. 4 credits. Not offered 1995-96.

ANTHR 653 Myth onto Film (also Theatre Arts 653) Fall. 4 credits. Enrollment limited by available studio space and equipment. Prerequisite: Readiness of knowledge of one of the following: anthropology, filmmaking, mythology, graphics, drawing, or painting. Open to undergraduates and graduate students with permission of instructor. Fee for film screening and maintenance, $50. R. Asher.


ANTHR 660 Latin American and the Philippines Spring. 4 credits. C. D. Sanchez. This seminar will focus on the place of sex and gender in the social sciences as relevant to research on Latin America and the Philippines. It will also address methodological issues, such as collecting and representing data on gender.

ANTHR 662/663 Democratizing Research: Participation, Action, and Research Fall. 4 credits. For description, see ANTHR 362/662.

ANTHR 663 Participatory Action Research Spring. 4 credits. Prerequisite: Anthropology 362/662. Enrollment limited to 20 students. D. J. Greenwood. This seminar is a practicum in participatory action research (PAR) in which the semester becomes a self-managed learning environment for the exploration of the techniques and group processes involved in PAR, including co-generative learning, searching, and PAR facilitation. Participation in a seminar-centered LISTSERV on the Internet is expected.

ANTHR 665 Native American Contributions to Anthropological Thought Spring. 4 credits. Not offered 1995-96.

ANTHR 673 Human Evolution: Concepts, History and Theory (also Biological Sciences 673) Fall. 3 credits. Not offered 1995-96.

ANTHR 675 Evolutionary Theory and Human Behavior Fall. 4 credits. M. Small. One of the major recent controversies in anthropology focuses on the role of evolution in the behavior of modern humans. Some scholars feel that even since our species became sentient, and developed ways to override or bypass nature, the rules of Natural Selection were suspended. Others are convinced that buried deep within our consciousness are strategies, thoughts, and desires that were molded long ago but still motivate our lives. This seminar will examine the role of evolution in modern human behavior. First, we will read the...
evolutionary theory upon which current hypotheses are based. Second, the class will read, discuss, and criticize the most recent literature on the evolution of human behavior. We will ask several questions: Is current human behavior molded by the rules of Natural Selection? Do the modern theorists present a convincing argument? How would these theories be tested? What contribution does this work make (or not make) to the larger field of anthropology?

Related Courses in Other Departments

**ARTS AND SCIENCES - 1995-1996**

**ARKEO 681-682 Master's Thesis**

681, fall; 682, spring. S-U only. Limited to students admitted to Master's Program in Archaeology. Students, working individually with faculty member(s), prepare a Master's Thesis in Archaeology.

**B. Theory and Interdisciplinary Approaches**

([ARKEO 202 Interpretive Archaeology (also Anthropology 202)](al)

Fall. 3 credits. Basic. Limited to 60 students. Not offered 1995-96.

T. P. Volman.

An introduction to the analysis and interpretation of archaeological data, especially stone and ceramic artifacts, and related contextual data, such as the remains of plants and animals. Emphasis is on the use of archaeological data to answer questions about ancient human behaviors, lifeways, and cultural change. Topics include the formation of the archaeological record, the characterization and classification of artifacts, and the analysis of artifact distributions through space and over time. Section meetings include demonstrations, visits to campus facilities, and analyses of artifacts from Cornell archaeological collections.

**ARKEO 203 Early People: The Archaeological and Fossil Record (also Anthropology 203)**

Fall. 3 credits. Basic. T. P. Volman.

A survey of the archaeological and fossil record of human evolution. Contributions by researchers from a variety of disciplines are highlighted, as are the discoveries, personalities, and controversies that have enlivened the study of human evolution in the past century. Critical evaluation of evidence and interpretations will be stressed. Demonstrations and films supplement the lectures.

**ARKEO 204 Ancient Civilizations (also Anthropology 204)**

Fall. 3 (4) V credits. J. S. Henderson. For description, see ANTHR 204.

([ARKEO 317 Stone Age Archaeology (also Anthropology 317)](al)

Fall. 4 credits. Not offered 1995-96.

T. P. Volman.

A survey of current approaches to the archaeological record of Stone Age peoples, from the earliest sites to those of recent times. Case studies are used to illustrate the nature of archaeological occurrences, excavation procedures, and analytical methods. Multidisciplinary efforts to expand our knowledge of prehistoric lifeways and behaviors are a major concern of the course.

([ARKEO 404 Approaches to Archaeology (also Anthropology 404)](al)


An exploration of the concepts that have shaped modern archaeology. The course briefly examines the history of theoretical orientations in archaeology, then considers the variety of perspectives and interpretive frameworks that guide present-day investigations. Case studies illustrate the implications of the nature of the archaeological record for reconstructing subsistence and economic systems, trade, social and political organization, demography, and ideology.
undergraduate seminar especially recommended for undergraduate major and graduate archaeologists but open to anyone with a serious interest in archaeology.

ARKEO 494 Seminar in Archaeology: Archaeology of the Household (also Anthropology 494) #
Spring. 4 credits. J. S. Henderson.
An exploration of the household as a unit of human ecology and the role of environment within the household. It will be also be paid to relations to early Christian art in terms of its Near Eastern Graeco-Roman environment. Attention will be given to Palestine and the Diaspora.

LA 261 Urban Archaeology (also CRP 261)
Fall. 3 credits. S. Baugher.
For description, see LA 261.

LA 569 Archaeology in Historic Preservation Planning
Fall. 3 credits. Not offered 1995-96. S. Baugher.
For description, see LA 569.

C. Old World Archaeology

ARKEO 221 Minoan-Mycenaean Art and Archaeology (also Classics 221 and History of Art 221) #
Spring. 3 credits. Basic. Students may not obtain credit for both this course and Classics 319. J. Coleman.
The birth of civilization in Greece and the Aegean islands during the Bronze Age. The main focus is on the rise and fall of Minoan Crete and Mycenaean Greece, with consideration given to the nature and significance of Aegean interactions with Egypt, the Near East, and Anatolia.

ARKEO 233 Archaeology in Action II (also History of Art 225 and Classics 233) #
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1995-96. P. I. Kuniholm.

ARKEO 247 Introduction to Jewish Art and Archaeology from the Hebrew Bible to the Rabbinic Period (also NES 247, Classics 249 and RELST 247) @
Fall. 3 credits. L. Kant.
In this course, we will examine material evidence of Judaism from the fourth century b.c.e. to the fifth century ce. Equal attention will be given to Palestine and the Diaspora. We will look at various kinds of structures, including tombs and cemeteries, prayer buildings and synagogues, houses, fortresses, palaces, and the Jerusalem Temple. All types of objects will come under consideration, such as paintings, mosaics, sarcophagi, jewelry and gemstones, coins, inscriptions, and papyri. In general, we will attempt to understand this material both in terms of its Near Eastern heritage and the powerful influence of the Graeco-Roman environment. Attention will also be paid to relations to early Christian art and archaeology.

ARKEO 263 Introduction to Biblical History and Archaeology (also NES 263 and Jewish Studies 263) Spring. 3 credits. Not offered 1995-96. D. I. Owen.


ARKEO 320/620 An Introduction to Early Medieval Archaeology and Culture #

ARKEO 357 Greek Sanctuaries and Pausanias (also Classics 457) #

ARKEO 424 Sardis and the Cities of Asia Minor (History of Art 432 and Classics 432) #
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1995-96. A. Ramage.

ARKEO 434 The Rise of Classical Greece (also History of Art 434 and Classics 434) #
Spring. 4 credits. Recommended. Classics 220 or 221 or History of Art 220 or 221 preferred. Not offered 1995-96. P. I. Kuniholm.

For description, see ART H 520.

ARKEO 459 The Prehistoric Aegean and Cyprus (also Classics 629) #
Fall. 4 credits. For graduate students, and advanced undergraduates with permission of instructor. Not offered 1995-96; next offered 1995-96. P. I. Kuniholm.

CLASS 219 Mediterranean Archaeology (also Near Eastern Studies 267) @
For description, see CLASS 219.

CLASS 326 Greek Cities and Towns (also History of Art 326) #
Spring. 4 credits. Prerequisite: Classics/History of Art 220 or permission of instructor. Not offered 1995-96. J. Coleman.

CLASS 333 Greek and Roman Mystery Cults and Early Christianity (also Religious Studies 333)
Spring. 4 credits. A previous course in Classics (civilization or language) or Religious Studies 101 is recommended. Not offered 1995-96; next offered 1997-98. K. Clinton.

ART H 220 Introduction to Classical Archaeology (also Classics 220) #
Fall. 4 credits. Basic. A. Ramage.
For description, see ART H 220.

ART H 320 Arts and Monuments of Athens (also Classics 320) #
Fall. 4 credits. Prerequisite: Classics 220 or permission of instructor. Not offered 1995-96.

ART H 322 Arts of the Roman Empire (also Classics 350)
Spring. 4 credits. A. Ramage.
For description, see ART H 322.

ART H 325 Greek Vase Painting (also Classics 325) #
Fall. 4 credits. Not offered 1995-96. A. Ramage.

ART H 327 Greek and Roman Coins (also Classics 327) #

ART H 427 Seminar on Roman Art and Archaeology (also Classics 435) #

[NES 367 History and Archaeology of Ancient Egypt] @

D. New World Archaeology

ARKEO 355 Ancient Mexico and Central America (also Anthropology 355) @
A survey of the cultural history of ancient Mexico and Central America, emphasizing Aztec and Maya civilizations. The use of ethnographic and historical information to enrich archaeological interpretation is a general theme. Special topics include the emergence of settled farming life, the rise of civilization and the state, and the development of mechanisms that linked the many societies in the region into a single sphere of interaction.

ARKEO 493 Seminar in Archaeology: The Aztecs (also Anthropology 493) @

[ANTHR 456 Mesoamerican Religion, Science, and History] @
Fall. 4 credits. Not offered 1995-96. J. Henderson.
For description, see ANTHR 456.

LA 360/666 Pre-Industrial Cities and Towns of North America (also CRP 360/666)
Fall. 3 credits. S. Baugher.
For description, see LA 360.

E. Methodology and Technology

ARKEO 285 Art, Archaeology, and Analysis (also Engineering 185, M&S 285, Physics 200, English 285, Art 372, and Classics 285)
Spring. 3 credits. Staff.
For description, see M&S 285.

ARKEO 309 Dendrochronology of the Aegean (also History of Art 309 and Classics 309)
Spring. 4 credits. Limited to 10 students. Prerequisite: permission of instructor. P. I. Kuniholm.
Participation in a research project of dating modern and ancient tree-ring samples from the Aegean and Mediterranean. Supervised reading and laboratory work. A possibility exists for summer fieldwork in Greece or Turkey.

ARKEO 370 Environmental Archaeology (also Archaeology 370 and Anthropology 370 and 670)
Fall. 4 credits. Prerequisite: two previous courses in archaeology or permission of instructor. T. P. Volman.
A survey of selected topics in paleo-environmental analysis and reconstruction, with emphasis on how they inform interpretations of the archaeological record. The course ranges broadly from a general consideration of human ecology and the role of environ-
ARTS AND SCIENCES - 1995–1996

[ARKEO 402 Archaeology Research Design (also Anthropology 402)]
Spring. 4 credits. Basic. Prerequisite: permission of instructor. Not offered 1995–96. J. S. Henderson, T. P. Volman. Archaelogical practice demands careful definition of research objectives and appropriate strategies before excavation or other fieldwork begins. Critical information lies in the arrangement and associations of objects and structures. Thus the context should be a basic concern of any field investigation, particularly when it is destroyed by excavation. This course relies on case studies to illustrate how surveys, excavations, and analytical techniques must be tailored to solving specific problems. A seminar especially recommended for undergraduate majors and graduate archaeologists but open to anyone with a serious interest in archaeology.

ARKEO 423 Ceramics (also History of Art 423 and Classics 423)
Spring. 4 credits. Prerequisite: permission of instructor. J. S. Coleman. Bronze Age, Greek, and Roman pottery specimens from Near Eastern and Mediterranean sites will be studied to provide direct evidence in support of the basic prerequisites of archaeological excavation—identification and dating of pottery types. Reports, delivered in class, will concern ancient ceramic materials or particular types and periods. Practical experience in making and decorating pottery will be encouraged.

ARKEO 458 Archaeological Analysis (also Anthropology 458)
Fall. 4 credits. Prerequisite: one course in archaeology or permission of instructor. Enrollment limited to 15 students. J. S. Henderson. An introduction to methods of recording, processing, and analyzing archaeological data. Topics include recording of excavation and survey data in the field; processing artifacts in the laboratory; storing and retrieving data; and basic methods of tabulating, analyzing, and interpreting artifacts (mainly ceramic vessels), stratigraphy, and spatial distributions. Intended for those with some understanding of the uses to which archaeological data are put in regional synthesis and interpretation; previous field experience is helpful.

ARKEO 601 Graduate Colloquium in Archaeology
Fall. 4 credits. Open to graduate students and advanced undergraduates by permission of instructor. Staff. Faculty members of the Program in Archaeology and invited speakers will present summaries of the different aspects of archaeological analysis. Topics may include: lithics, ceramic typology, petrographic and neutron activation analysis, dendrochronology and other chronological techniques, settlement patterns, inscriptions, human and animal bones.

ARKEO 670 Environmental Archaeology (also Archaeology 370 and 570) [Formerly: Anthropology 370 and 570]
Fall. 4 credits. Prerequisite: two previous courses in archaeology or permission of instructor. T. P. Volman. For description, see ARKEO 370.

[ANTHR 371 Human Paleontology (also Biological Sciences 371)]
Fall. 4 credits. Prerequisite: one year of introductory biology, Anthropology 101, or permission of instructor. Not offered 1995–96. K. A. R. Kennedy.

[ANTHR 474 Laboratory and Field Methods in Human Biology (also Biological Sciences 474)]
Spring. 5 credits. Prerequisite: one year of introductory biology, Anthropology 101, or permission of instructor. Not offered 1995–96. K. A. R. Kennedy.

GEOL 441 Geomorphology
Fall. 3 credits. Prerequisites: Geological Sciences 102 or 201, or permission of instructor. A. L. Bloom. For description, see GEOL SCI.

GEOL 442 Glacial and Quaternary Geology
Spring. 3 credits. Prerequisite: Geological Sciences 441 or permission of instructor. Offered alternate years. A. L. Bloom. For description, see GEO SCI.

ASIAN AMERICAN STUDIES
See Special Programs and Interdisciplinary Studies.

ASIAN STUDIES

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 outside the 400 level (ASIAN is the prefix) are taught in English and are open to all students in the university. Some of these courses may be counted toward majors in other departments; others fulfill the humanities distribution requirement. Courses listed under Asian Studies offered through other departments may fulfill distribution requirements in history, social sciences, and arts.

The Major
The applicant for admission to the major in Asian studies must have completed at least one area study course, selected from among those listed under the Department of Asian Studies and must receive permission for admission to the major from the director of undergraduate studies. The student must have received a minimum grade of C in this course and in all other courses counted toward the major.

A student majoring in Asian studies is required to complete two courses at the 200 level (a minimum of 6 credits with a grade of C or better) in one of the Asian languages offered at Cornell. The major consists of 30 additional credits (which may include up to 6 credits of further language study) selected by the student in consultation with his or her adviser from among the courses listed under the Department of Asian Studies and numbered 250 and above. Majors in Asian studies normally specialize in the language and culture of one country and often choose an additional major in a traditional discipline.

Concentration in South Asia Studies
A candidate for the Bachelor of Arts or Science degree at Cornell may take a concentration in South Asia Studies by completing at least 18 credits of course work, including Asian Studies 215 (Introduction to South Asia) and four courses at the intermediate or advanced level, two of which may be South Asian language courses.

Students taking a concentration in South Asia studies are considered members of the South Asia Program and will have an adviser from the program faculty. (This adviser will be for the student's concentration and is not a substitute for a student's academic adviser in his or her major.)

One South Asian graduate course may be taken for the concentration with consent of both the instructor and the adviser. The same applies for one South Asia-related course with a research paper on a South Asian topic.

Additional courses may be added if offered with comparable South Asia content.

Concentration in Southeast Asia Studies
A candidate for the Bachelor of Arts or Bachelor of Science degree at Cornell may take a concentration in Southeast Asian studies by completing 15 credits of course work. A recommended plan would include Asian Studies 208 and three courses at the intermediate or advanced stage, two of which could be a concentration.

Students taking a concentration in Southeast Asia studies are members of the Southeast Asia Program and are assigned an adviser from the program faculty. Such students are encouraged to commence work on a Southeast Asian language either at the 10-week intensive courses offered by the Southeast Asia Studies Summer Institute or by studying for one semester at IKIP Malang, Indonesia; Khon Kaen University, Thailand; and Hanoi University, Vietnam. Fellowships are available for undergraduates through the Cornell Abroad Program.

Honors
To be eligible for honors in Asian studies, a student must have a cumulative grade average of A in all Asian Studies area courses, exclusive of language study only, and must successfully complete an honors essay during the senior year. Students who wish to be considered for honors should apply to the director of undergraduate studies during the second term of their junior year. The application must include an outline of the proposed project and the endorsement of a faculty adviser. During the first term of the senior year the student does research for the
essay in conjunction with an appropriate Asian studies course or Asian Studies 401. Students of China and Japan must also complete Asian Studies 611 or 612, respectively. By the end of the first term the student must present a detailed outline of the honors essay and have it approved by the faculty sponsor and the director of undergraduate studies. The student is then eligible for Asian Studies 402, the honors course, which entails writing the essay. At the end of the senior year, the student has an oral examination (with at least two faculty members) covering both the honors essay and the student's area of concentration.

**Intensive Language Program (FALCON)**

For those students desiring to accelerate their acquisition of Chinese, Japanese, or Indonesian, Cornell offers a full-time intensive language program, the Full-Year Asian Language Concentration (FALCON). FALCON students spend six hours a day, five days a week, for periods of up to a full year studying only the language and thus are able to complete as many as twelve hundred hours of supervised classroom and laboratory work in one year. For further information, students should contact the FALCON Program Office, Department of Modern Languages and Linguistics, 203 Morrill Hall (telephone: 607/255-6457).

**Study Abroad**

Cornell is a member of the Inter-University Centers for Chinese Language Study in Taipei and for Japanese Language Study in Yokohama and a member of the Council on International Educational Exchange offering study in China at Peking University and Nanjing University. These centers offer intensive training in both spoken and written forms of the languages. The Kyoto Center for Japanese Studies (KCJS) is an undergraduate program for students who want to spend a year in Japan studying both language and culture.

Cornell is a class-A member of the American Association of State Colleges and Universities—Trivandrum. The Intercollegiate Sri Lanka Education program (ISLE) offers an undergraduate curriculum in Sinhala, Buddhist studies, and the culture and civilization of Sri Lanka, at Peradeniya University in Kandy. Cornell also offers study abroad opportunities in South Asian studies at the School of Oriental and African Studies at the University of London. For further details, contact the South Asia Program office, 170 Uris Hall (telephone: 607/255-9925).

Cornell and the central campus of the Nepalese national university—Trivathan—at Kirtipur, Kathmandu, cosponsor an academic semester or year in Nepal. North American students may study and live with Nepalese students who come from outside the Kathmandu Valley to Trivathan. Students may participate in one or two semesters. Courses are offered both at Trivathan University and at the Cornell-Nepal Study Program House adjacent to the university. These courses are officially taught in English. A five-week, in-country orientation program includes classes in intensive Nepali conversation, cultural orientation programs, and a ten-day field trip and trek. Semester course offerings include Nepali language (Tibetan and/or Newari Languages also possible), contemporary issues in Nepalese studies, field research design and methods in sociology/anthropology and ecology/environment, and guided field research.

Juniors and seniors in good academic standing from any major field may participate. Students must have a desire to study on the other side of the world, to participate in a multicultural program, and to undertake rigorous field research. No experience in Nepal is necessary and instruction is in English, but some prior Nepali language study is strongly recommended. Students interested in the study abroad in Nepal program should consult with the Cornell Abroad office (474 Uris Hall) for further information.

Other opportunities include a junior year abroad at IKP-Malang, in Indonesia, or at the School of Oriental and African studies, University of London. Many other options for study in Asia exist, including in Indonesia, Thailand, and Vietnam through the Council for International Educational Exchange. Undergraduates should contact Cornell Abroad Office; graduate students should inquire at the East Asia Program, the South Asia Program, or the Southeast Asia Program offices.

**General Education Courses**

**ASIAN 206 Introduction to Southeast Asia** @  
Spring. 3 credits. T. Chaloeemtiran.  
This course is for anyone curious about the part of Asia with the most diversity; it defines Southeast Asia both as the nation-states that have emerged since 1945 (Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Viet Nam) and as a larger cultural world extending from southern China to Madagascar and Polynesia. Students will find a serious, organized introduction to a variety of disciplinary and topical approaches to this region, including geography, linguistics, history, religion and ideology, anthropology, marriage and family systems, music, literacy and literature, agriculture, industrialization and urbanization, politics and government, warfare and diplomacy, ecological and human degradation, business and marketing. The course aims to teach both basic information and different ways of interpreting that information.

**ASIAN 211 Introduction to Japan** @  
Fall. 3 credits. K. Brazell.  
An interdisciplinary introduction to Japanese society and its history especially designed for students not majoring in Asian Studies. The first part of the course focuses on the historical changes in Japanese society from the eighth century down to the twentieth century; the second part analyzes modern society from a variety of perspectives. It also addresses the question of how Japan is represented in the U.S. mass media. Guest lecturers from five or six different fields offer their opinions on Japanese history, culture, and politics.

**ASIAN 212 Introduction to China** @  
Spring. 3 credits (4 credits with a special project, consult instructor for information). E. Gunn.  
An interdisciplinary introduction to Chinese culture especially designed for students not majoring in Asian studies.

**ASIAN 215 Introduction to South Asian Civilization** @  
Fall. 3 credits (4 credits with a special project, consult instructor for information). J. Doolittle.  
An interdisciplinary introduction to the culture and history shared by India and other states of South Asia. Designed for students not majoring in Asian Studies. Guest lecturers will provide the perspective of their disciplines to the general themes of the course: cultural diversity and the role of tradition in contemporary life.

**ASIAN 218 Introduction to Korea** @  
Spring. 3 credits. D. McCann.  
An interdisciplinary introduction to Korean history and culture, including language, literature, art, and music. The course begins with an overview of Korean history from the Three Kingdoms Period to the present. The course then focuses on major events in twentieth-century Korean history: the March 1, 1919, Independence Movement, the Korean War, the 1960 Student Revolution, the 1980 Kwangju Massacre, and others. Visiting lecturers will speak about Korea from a variety of disciplinary viewpoints, including linguistics, sociology, anthropology, political science, and law.

**Asia—Literature and Religion Courses**

The following courses are taught entirely in English and are open to any Cornell student.

**ASIAN 250 Introduction to Asian Religions (also Religious Studies 250)** @  
Fall. 3 credits. J. M. Law.  
A survey of the major religious traditions of India, China, and Japan, focusing on Vedic ritual and Brahmanical Hinduism; Indian, Chinese, and Japanese Buddhism; the native Chinese traditions of Confucianism and Taoism; and Shinto, Confucianism, and the new religions in Japan. Emphasis will be on the great traditions of these cultures, with frequent reference to the differing realms of popular religions.

**[ASIAN 251 Women's Experience in Asian Religions (also Religious Studies 251)] @**  

**ASIAN 270 Hidden Songs in Greece and Asia (also Comp. Lit. 224 and Classics 224)** @  
Spring. 3 credits. D. McCann, G. Holst-Warhaft.  
This course will explore four similar moments in cultural histories when pre-literate folk traditions became incorporated into emerging or recently established literate ones. It will examine important early anthologies of songs, stories, myths, fables, genealogies, and other materials from China (the Shih ching), Japan (the Kokaku), Korea (the Samguk Yusa), and Greece (tragedy and laments). The major part of the course explores the hypothesis that pre-literate, folk materials are incorporated into an official and literary canon, certain transactions occur between the two realms of discourse in which, once canonically eminent, items identified with disorder are repressed in favor of these identified with order. The final segment of the course will be a brief examination of the process by which songs and their performances have been deemed by contemporary, popular political movements in the Republic of Korea, the People's Republic of China, and Greece.
**ASIAN 355 Japanese Religions (also Religious Studies 355)**

Fall. 4 credits. J. M. Law.

This course is an exploration of major themes in Japanese religion through a focus on the category of religious practice. After an overview of the major sources of Japanese religion, we look at the dominant understanding of sexuality and the human soul. With the synchronic interaction between Shinto and Buddhism as our foundation, we will study four dynamic themes that express aspects of Japanese religious practice: 1) ritual purity and pollution of the shinto (festival) and girei (rite), 3) the concept of shugyo (cultivation) as expressed in asceticism, pilgrimage, and aesthetic discipline, and 4) religious understandings of the human body, expressed in healing rituals.

**ASIAN 359 Japanese Buddhism (also Religious Studies 359)**


A comparative study of Japanese and American mass cultures. Rather than seeking, through comparison, to delineate distinctive models of national cultures, the course will trace the complex relationships between cultural nationalist impulses and transnational economies, emphasizing processes of hybridity and fusion. The course will introduce students to a small number of important theoretical writings on mass culture. Areas of study will include the analysis of science fiction, comic books, film and video, popular music, and toy industries. Enrollment limited to 25 students.

**ASIAN 363 Contemporary Mass Culture in Japan and the U.S. (also Comparative Literature 343)**

Fall. 3–4 credits. B. de Bary.

A comparative study of Japanese and American mass cultures. Rather than seeking, through comparison, to delineate distinctive models of national cultures, the course will trace the complex relationships between cultural nationalist impulses and transnational economies, emphasizing processes of hybridity and fusion. The course will introduce students to a small number of important theoretical writings on mass culture. Areas of study will include the analysis of science fiction, comic books, film and video, popular music, and toy industries. Enrollment limited to 25 students.

**ASIAN 378 The Postwar and the Postmodern in Japanese Literature**

Spring. 4 credits. Alternates with AS 375. N. Sakai.

A study in English translation of major narratives from the eighteenth to the twentieth century. Subject matter will include novelistic narratives like The Tale of Genji, biographical stories, poem tales, war tales, and popular stories.

**ASIAN 357 Chinese Religions (also Religious Studies 357)**


**ASIAN 358 Chinese Buddhism (also Religious Studies 356)**


**ASIAN 359 Japanese Buddhism (also Religious Studies 359)**


A comparative study of Japanese and American mass cultures. Rather than seeking, through comparison, to delineate distinctive models of national cultures, the course will trace the complex relationships between cultural nationalist impulses and transnational economies, emphasizing processes of hybridity and fusion. The course will introduce students to a small number of important theoretical writings on mass culture. Areas of study will include the analysis of science fiction, comic books, film and video, popular music, and toy industries. Enrollment limited to 25 students.

**ASIAN 371 Chinese Philosophical Literature**

Spring. 4 credits. T. L. Mei.

Readings in English translation of Confucian, Taoist, and Buddhist works.

**ASIAN 373 Twentieth-Century Chinese Literature**

Fall. 4 credits. E. Gunn.

A survey of the principal works in English translation, the course introduces fiction, drama, essays, and poetry of China beginning with the Republican era and continuing up to the present in the People's Republic and Taiwan, with attention to social and political issues and literary theory.

**ASIAN 421 Religious Reflections on the Human Body (also Religious Studies 421)**

Spring. 4 credits. J. M. Law.

One undeniable and inescapable fact of human life is that it is experienced in a body. How this fact is understood to define the parameters of religious experience and expression will be the topic of this course. While the format will be comparative, the majority of cases will be drawn from East Asian, primarily Japanese, sources. We will explore how such aspects of the human body are experienced in a religious context.
as ecstasy, gender, sexual passion, illness, the
dialectic of the physical and the spiritual, and
corporeal ascetic discipline reveal models of
religious reflection on this fact of human
experience. Further, we will study how these
models become represented in visual art,
narrative, and ritual practice.

[ASIAN 440 Meditation Schools of East
Asian Buddhism (also Religious
Studies 440)]
Spring. 4 credits. Prerequisite: ASIAN 250
J. McRae.

[ASIAN 441 Mahayana Buddhism]
Fall. 4 credits. Not offered 1995–96.
J. McRae.

[ASIAN 449 History and Methods of the
Academic Study of Religion #]
For description, see RELST 449. Not offered

[ASIAN 461/625 Children, Literature,
and Society (also Anthropology 441/625)]
Spring. 4 credits. S. Shiraiishi.

ASIAN 460 Indian Meditation Texts (also
Religious Studies 460)
Spring. 4 credits. S. Gold.
Because texts that record visionary experi­
ence, prescribe the practice of contemplation,
and present enigmatic utterances are highly
valued in Indian tradition, they need to be
taken seriously by students of Indian and
world civilizations. Yet the special problems
of interpretation that they present have often
cause meditative texts to be passed over in
embarrassed, sometimes reverent silence. In
this course we will draw on approaches from
literary criticism, anthropology, and religious
studies to explore a number of the problems
to which these texts give rise: In what ways
are the apparent differences in experience
presented in meditation texts shaped by
different cosmologies and ritual practice? Do
different literary genres have particular
religious implications? What are the relations
between convention and experience in the
creation of the texts? Readings will be drawn
from the Upanishads and Tantra, devotional
verse in the vernaculars, and the classical
meditation manuals of Hinduism and
Buddhism. Some attention may be given to
Indian Sufi materials. No knowledge of
Indian languages is required.

ASIAN 463 Readings in Hindi and Urdu
Literature
Fall. 4 credits. D. Gold.
Selected topics in Hindi and Urdu literature,
with readings in the original; discussions in
Hindi-Urdu and English. May be repeated for
additional credit with consent of instructor.

ASIAN 470 The Japanese Noh Theater
and Modern Dramatists (also
Comparative Literature 470 and
Theater Arts 470)
Fall. 4 credits. Alternates with ASIAN 471.
K. Brazeal.
Several weeks will be spent studying the
literary, performance, and aesthetic aspects of
the noh theater. Emphasis will be on noh as a
performance system, a total theater in which
music, dance, costume, and props all
interact to create the total effect. Then
attention will turn to modern theater people
who have reacted to noh in some creative
way. Choice of dramatists will depend partly
on student interests but will probably include
Yeats, Brecht, Britten, Claudel, Grotowski, and
Mishima. All readings may be done in English
translation.

[ASIAN 471 Japanese Theatre (also
Theatre Arts 471)]
Fall. 4 credits. Alternates with ASIAN 470.

[ASIAN 475 Modernization and the
Korean Family (also HSS 490 sec 30)]
Fall. 3 credits. Not offered 1995–96.
D. McCann. J. Mueller.

[ASIAN 481 Translation and Identities]
Fall. 4 credits. Not offered 1995–96.
N. Sakai.

ASIAN 483 Internationalism,
Nationalism, and Modern Japanese
Discursive Space
Fall. 3 credits. N. Sakai.
The late 19th century marked an important
transitional period, nation-states formed in
Britain, France, Japan, Germany, the United
States, and elsewhere sought to become
imperial powers, and “internationalism”
virtually collapsed. Focusing on Japanese
examples but not excluding other cases, we
will study the discursive spaces of modern
national subjectivity with a view to the
problems of ethnicity, colonialism, imperial
sexism, violence, historical memory, post-
coloniality and academic knowledge. A major
critical paper will be required.

ASIAN 496 Tokugawa Literature and
Thought
Spring. 4 credits. N. Sakai.
An introduction (in English translation) to
literary, theatrical, and intellectual works of
the Tokugawa period (1600–1868). We will
examine the characteristics of Early Tokugawa
literary and theatrical works and see how
different they are from the literary works of
the later Tokugawa period. We will also read
the philosophical and philological works on
the classics by writers such as Ogyu Sorai and
Motoori Norinaga to understand the ways
contemporary Japanese intellectuals under­
stood cultural activities and literature during the
Tokugawa period.

Asia—Graduate Seminars
For complete descriptions of courses
numbered 600 or above, consult the graduate
courses listing.

ASIAN 601 Southeast Asia Seminar:
Indonesia
Fall. 4 credits. T. Shiraiishi. J. Siegel.

ASIAN 602 Southeast Asia Seminar:
Thailand
Spring. 4 credits. T. Kirsch. D. Wyatt.

[ASIAN 604 Southeast Asia Seminar]

ASIAN 605-606 Master of Arts Seminar
in East Asian Studies
605, fall; 606, spring. 2–4 credits. Staff.

[ASIAN 607-608 The Plural Society
Revisited (also Government 653)
Spring. 4 credits. 607 may be taken
independently for credit; 608 is a
B. Anderson.

[ASIAN 609 Modern Japanese Studies:
The Formation of the Field]
For description, see HIST 609. Not offered

ASIAN 611 Chinese Bibliography and
Methodology
Spring. 1 credit. Prerequisite: permission
of instructor. Required of honors students
and M.A. candidates. C. D’Orban.

ASIAN 612 Japanese Bibliography and
Methodology
Fall. 1 credit. Prerequisite: permission
of instructor. Required of honors students
and M.A. candidates. Staff.

[ASIAN 621-622 South Asia Seminar:
Topic to be announced]
621, Fall; 622, Spring. 4 credits. Not

ASIAN 630 Strategies for Acquiring and
Using Knowledge
Spring. 2–4 credits. K. Taylor.
A graduate seminar designed to introduce
students to contemporary theory while
relating it to their research specialization.
Readings and discussion about narrative,
epistemological archaeology, translation,
deconstruction, feminism, postmodernism,
 multiculturalism, and chance operations.
Neither area- nor discipline-specific. Graduate
students only.

ASIAN 650 Graduate Seminar in Asian
Religions
Spring. 2–4 credits. Prerequisite:
permission of instructor. J. M. Law.

ASIAN 676 Southeast Asia Research
Training Seminar
Staff.

ASIAN 701-702 Seminar in East Asian
Literature
701, Fall; 702, spring. 1–4 credits. Staff.

ASIAN 703-704 Directed Research
703, fall or spring; 704, fall or spring.
Credit to be arranged. Staff.

For additional courses on Asian religion, see
“Related Courses” in the China and Japan area
courses listing.

Asia—General Courses

ASIAN 401 Asian Studies Honors Course
Fall or Spring. 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.

ASIAN 402 Asian Studies Honors: Senior
Essay
Fall or spring. 4 credits. Prerequisite:
permission to the honors program. Staff.
The student, under faculty direction, prepares
an honors essay.

ASIAN 403-404 Asian Studies
Supervised Reading
Fall, spring, or both. Credit to be
arranged. Prerequisite: permission of
instructor. Open to majors and other
qualified students. Intensive reading under
the direction of a member of the staff.
ARTS AND SCIENCES - 1995-1996

Literature in Chinese

C HLIT 213-214 Introduction to Classical Chinese @
Fall, 214, spring. 3 credits each term. Prerequisite: qualification in Chinese or permission of instructor. May be taken concurrently with Chinese 101-102, 201-202, 301-302. T. L. Mei.

C HLIT 420 T'ang and Sung Poetry @
Spring. 4 credits. Prerequisite: permission of instructor. Not offered 1995-96. T. L. Mei.

C HLIT 421-422 Directed Study
Fall or spring. 2-4 credits each term. Prerequisite: permission of instructor. Staff.

C HLIT 424 Readings in Literary Criticism
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered 1995-96. T. L. Mei.

C HLIT 435 Chinese Buddhist Texts @

C HLIT 603 Seminar in Chinese Fiction and Drama
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1995-96. E. Gunn.

C HLIT 605 Seminar in Chinese Fiction and Drama
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1995-96. E. Gunn.

C HLIT 610 Chinese Cultural Criticism
Fall. 4 credits. Not offered 1995-96. E. Gunn.

C HLIT 621-622 Advanced Directed Reading: Chinese Historical Syntax
Spring. 2-4 credits. Prerequisite: permission of instructor. Staff.

Literature in Japanese

JPLIT 406 Introduction to Classical Japanese @
Fall. 4 credits. Prerequisite: permission of instructor. N. Sakai.

JPLIT 407 Advanced Classical Japanese
Spring. 4 credits. Prerequisite: JPLIT 406 or permission of instructor. Not offered 1995-96. K. Brazell.

JPLIT 421-422 Directed Readings
421, fall; 422, spring. Credits to be arranged. Prerequisite: for Japanese 421, Japanese 402 or equivalent; for Japanese 422, Japanese 421 or equivalent. Staff. Note: For complete descriptions of courses numbered 600 or above, consult the appropriate instructor.

JPLIT 611 Seminar in Classical Japanese Literature
Spring. 2-4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1995-96. K. Brazell.

[ JPLIT 613 Seminar in Tokugawa Culture and Thought: Otherness, Text, and Body
Spring. 2-4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1995-96. N. Sakai.]

JPLIT 614 Seminar in Modern Japanese Literature
Fall. 2-4 credits. Prerequisite: permission of instructor. Offered alternate years. B. de Bary, N. Sakai.

JPLIT 621 Advanced Readings in Pre-Modern Japanese Narrative Literature
Fall or spring. 4 credits. Prerequisite: permission of instructor. Not offered 1995-96. K. Brazell.

Graduate-Level Reading Courses

JPLIT 622 Advanced Readings in Pre-Modern Japanese Poetry
Spring. Credit to be arranged. Prerequisite: permission of instructor. Not offered 1995-96. K. Brazell.

JPLIT 623 Advanced Readings in Pre-Modern Drama
Fall or spring. Credit to be arranged. Prerequisite: permission of instructor. Not offered 1995-96. K. Brazell.

JPLIT 624 Advanced Readings in Modern Japanese Literature
Spring. 4 credits. Prerequisite: permission of instructor. Offered alternate years. B. de Bary.

Note: See courses listed under Asia—Literature and Religion Courses for Japanese literature courses in translation.

Japanese Language

See Modern Languages and Linguistics.

FALCON Program
255-6457; R. Sukle, 412 Morrill Hall, 255-0734; J. Whitman, 320 Morrill Hall, 255-0737; J. Wheatley, 416 Morrill Hall, 255-9301.

Literature in Korean

KRLIT 405 Readings in Korean Literature
Fall. 4 credits. D. McCann.

[KRLIT 406 Korean Literature Translation Workshop
Spring. 2-3 credits. Prerequisite: Korean 301-302 or equiv.; permission of instructor. Not offered 1995-96. D. McCann.]

Literature in Sanskrit

Sanskrit 251, see DMLL.

[BNLIT 467-468 Reading in Sanskrit Literature: The Vedas @
Spring. 3 credits. Prerequisite: permission of instructor. Not offered 1995-96. C. Minkowski.]

Related Courses in Other Departments

ANTHR 313 Anthropology of the City

ANTHR 474 Laboratory and Field Methods in Human Biology (also BIOES 474)
Not offered 1995-96.

ANTHR 619 Anthropological Approaches to the Study of Buddhism in Asia
Not offered 1995-96.

[ANTHR 673 Human Evolution: History, Concepts and Theory (also BIOES 673)
Not offered 1995-96.]

[GOVT 348 Politics of Industrial Societies
Not offered 1995-96.]

GOVT 349 Political Role of the Military

GOVT 647 Political Anthropology
Not offered 1995-96.

GOVT 648 Graduate Seminar in Political Economy of Change: Rural Development in the Third World

ART H 280 Introduction to Art History: Asian Traditions @

[ART H 396 The Arts of Southeast Asia @
Not offered 1995-96.]

[ART H 482 Ceramic Art of China and Southeast Asia @
Not offered 1995-96.]

[ART H 580 Problems in Asian Art
Not offered 1995-96.]

SOC 497 Social Relations Seminar

Related Courses in Other Colleges

The courses listed below will count as College of Arts and Sciences credit only for Asian studies majors.

ARME 464 Economics of Agricultural Development

ARME 660 The World's Food

ARME 665 Food and Nutrition Policy (also Nutritional Science 685)

ARME 763 Macro Policy in Developing Countries

ARCH 342 Architecture as a Cultural System

ARCH 445 Architecture and the Mythic Imagination

ARCH 446 The Indian Example and the Visual Tradition in Culture

[ARCH 667-668 Architecture in Its Cultural Context
Not offered 1995-96.]

COMM 624 Communication in the Developing Nations

COMM 685 Training and Development: Theory and Practice

ECON 473 Economics of Export-Led Development

[GOVT 482 International Relations of East Asia
Not offered 1995-96.]

GOVT 692 Administration of Agricultural and Rural Development

[ILR 637 Labor Relations in Asia and the Pacific Rim
Not offered 1995-96.]

China—Area Courses

[ANTHR 326 Economic Anthropology
Not offered 1995-96.]

[ANTHR 343 Religion, Family, and Community in China
Not offered 1995-96.]

[ANTHR 443 Religion and Ritual in Chinese Society
Not offered 1995-96.]
ECON 369  Economy of China  @
GOVT 347  Government and Politics of China  @
GOVT 391  Chinese Foreign Policy  @
GOVT 645  Chinese Politics  
[HIST 243  China and the West before Imperialism  @
Not offered 1995—96.]  
HIST 293  History of China up to Modern Times  @
[HIST 294  History of China in Modern Times  @
Not offered 1995—96.]  
[HIST 360  Early Warfare, East and West  #
Not offered 1995—96.]  
HIST 492  Undergraduate Seminar in Medieval Chinese History  @
HIST 493  Problems in Modern Chinese History  @
[HIST 494  The Japanese in Asia  @
Not offered 1995—96.]  
HIST 499  Problems in Modern Chinese History  @
HIST 691  Chinese Historiography and Source Materials  
HIST 693–694  Problems in Modern Chinese History  
HIST 791–792  Seminar in Medieval Chinese History  
[ART H 396  The Arts of Southeast Asia  @
Not offered 1995—96.]  
[ART H 481  The Arts in Modern China  @
Not offered 1995—96.]  
[ART H 482  Ceramic Art of China and Southeast Asia  @
Not offered 1995—96.]  
[SOC 545  Peasants, Market, and the State  
Not offered 1995—96.]  

China—Language Courses  
CHIN 101–102  Elementary Mandarin  
CHIN 109–110  Elementary Reading  
CHIN 111–112  Cantonese Elementary Speaking  
CHIN 113–114  Cantonese Elementary Reading  
CHIN 161–162  FALCON  @
CHIN 201–202  Intermediate Mandarin  @
CHIN 211–212  Intermediate Cantonese  @
CHIN 301–302  Advanced Mandarin I  @
CHIN 303–304  Advanced Mandarin Conversation  @
CHIN 411–412  Advanced Mandarin ii  
CHIN 413–414  Current Events  

Japan—Area Courses  
ANTHR 345  Japanese Society  @
ANTHR 645  Japanese Ethnology  
GOVT 346  Modern Japanese Politics  @
HIST 297  State, Society, and Culture in Japan  to 1750  @
[HIST 298  State, Society, and Culture in Modern Japan  @
Not offered 1995—96.]  
[HIST 352  The Past as Prelude? Japan in Asia, German in Europe  @
Not offered 1995—96.]  
HIST 420  Tale of Genji in Historical Perspective  @
[HIST 489  Undergraduate Seminar in Modern Japanese History  @
Not offered 1995—96.]  
[HIST 494  The Japanese in Asia  @
Not offered 1995—96.]  
[HIST 497  Premodern Japan-Historical Perspectives  @
Not offered 1995—96.]  
HIST 499  Problems in Modern Chinese History  @
[HIST 494  The Japanese in Asia  @
Not offered 1995—96.]  
[ART H 384  The Arts of Japan  @
Not offered 1995—96.]  
[NBA 580  Industrial Policy: Lessons for the United States from Japan and Europe  
Not offered 1995—96.]  
[R SOC 492  Development in the Pacific Rim  
Not offered 1995—96.]  
S HUM 405  Perception and Cognition  

Japan—Language Courses  
JAPAN 101–102  Elementary Japanese  
JAPAN 123  Accelerated Introductory Japanese  
JAPAN 161–162  FALCON  @
JAPAN 201–202  Intermediate Japanese Reading I  @
JAPAN 203–204  Intermediate Japanese Conversation  @
JAPAN 301–302  Intermediate Japanese Reading II  @
JAPAN 303–304  Communicative Competence  @
JAPAN 341–342  Advanced Japanese for Business Purposes  @
JAPAN 401–402  Advanced Japanese Reading @
JAPAN 404  Linguistic Structure of Japanese  
JAPAN 407–408  Oral Narration and Public Speaking  
JAPAN 410  History of Japanese Language  @
JAPAN 421–422  Directed Readings  
JAPAN 543–544  Intermediate Japanese for Business Purposes  
JAPAN 545–546  Advanced Japanese for Business Purposes  

South Asia—Area Courses  
[ABEN 754  Sociotechnical Aspects of Irrigation  
Not offered 1995—96.]  
ARME 660  The World's Food  
ARME 754  Sociotechnical Aspects of Watershed Development  
ANTHR 275  Human Biology and Evolution  
ANTHR 329  Peoples and Cultures of the Himalayas  @
[ANTHR 371  Human Paleontology  
Not offered 1995—96.]  
[ANTHR 448  Contemporary Approaches to South Asian Anthropology  @
Not offered 1995—96.]  
[ANTHR 619  Anthropological Approaches to the Study of Buddhism in Asia  
Not offered 1995—96.]  
ANTHR 640–641  South Asia: Readings in Specific Problems  
ARCH 342  Architecture as a Cultural System  
ARCH 441–442  Special Topics in Architectural Culture and Society  
ARCH 445  Architecture and the Mythic Imagination  
ARCH 446  Topics in Architecture, Culture, and Society  
ARCH 447  Architectural Design and the Utopian Tradition  
ARCH 448  The Indian Example and the Utopian Tradition  
ARCH 647–648  Architecture in its Cultural Context I & II  
ARCH 649  Graduate Investigations in Architecture, Culture, and Society  
[ARCH 667–668  Architecture in Its Cultural Context  
Not offered 1995—96.]  
AAS 250  South Asia Diaspora  
[BIOES 474  Laboratory and Field Method in Human Biology  
Not offered 1995—96.]  
[BIOES 673  Human Evolution: Concepts, History, and Theory  
Not offered 1995—96.]  
CRP 101  The Global City  
CRP 671  Seminar in International Planning  
[CRP 775  Transnational Corporations and Developing Regions  
Not offered 1995—96.]  
CRP 777  Theories of Development and Underdevelopment  
COMM 490  Special Topics in Communication  
COMM 611  Human Communication in Organizations  
COMM 624  Communication in the Developing Nations  
COMM 685  Training and Development  
ECON 375  Economic Problems of India  
GOVT 351  India: Social and Economic Change in a Democratic Polity  @
[GOVT 367  Politics of Development  
Not offered 1995—96.]  
[GOVT 436  Environmental Politics  
Not offered 1995—96.]  
[GOVT 640  Political Economy of India  
Not offered 1995—96.]  
GOVT 648  The Political Economy of Change  
[GOVT 649  Agrarian Political Economics  
Not offered 1995—96.]
ARTS AND SCIENCES - 1995-1996

[GOVT 651] Agrarian Change in South Asia—Politics, Society, and Culture
Not offered 1995-96.

[GOVT 687] International Environmental Policy
Not offered 1995-96.

GOVT 692 The Administration of Agricultural and Rural Development

HDFS 436 Language Development

HDFS 633 Seminar on Language Development

[ART H 386] Art of South Asia @
Not offered 1995-96.

ART H 489 Miniature Paintings and Drawings of India

ILRIC 637 Labor Relations in Asia

[LING 619] Rigveda
Not offered 1995-96.

[LING 635–636] Indo-European Workshop
Not offered 1995-96.

LING 701–702 Directed Research

[R SOC 425] Gender Relations and Social Change
Not offered 1995-96.

[R SOC 492] Developments in the Pacific Rim
Not offered 1995-96.

[R SOC 645] Rural Economy and Society

[R SOC 725] The Sociology of "Third World" States
Not offered 1995-96.

THETR 307–308 Indian Classical Dance: Odissi Style

South Asia—Language Courses

BENGL 121–122 Elementary Bengali

BENGL 201–202 Intermediate Bengali Reading @

BENGL 203–204 Intermediate Bengali Composition and Conversation @

BENGL 303–304 Bengali Literature I, II

HINDI 101–102 Elementary Hindi-Urdu

HINDI 109–110 Advanced Elementary Hindi-Urdu

[HINDI 201–202] Intermediate Hindi Reading @
Not offered 1995-96.

HINDI 203–204 Intermediate Composition and Conversation @

[HINDI 301–302] Advanced Readings in Hindi Literature @
Not offered 1995-96.

HINDI 303–304 Advanced Composition and Conversation @

[HINDI 305–306] Advanced Hindi Readings @
Not offered 1995-96.

NEPAL 101–102 Elementary Nepali

NEPAL 106 Intensive Nepali

NEPAL 201–202 Intermediate Nepali Conversation @

NEPAL 203–204 Intermediate Nepali Composition @

NEPAL 301–302 Advanced Nepali

PA LI 131–132 Elementary Pali

SINHA 101–102 Elementary Sinhala

SINHA 160 Intensive Sinhala

SINHA 201–202 Intermediate Sinhala Reading @

SINHA 203–204 Intermediate Composition and Conversation @

TAMIL 101–102 Elementary Tamil

TAMIL 201–202 Intermediate Tamil Conversation

TAMIL 203–204 Intermediate Tamil Composition

SANSK 131/132 Elementary Sanskrit (also Classics 131/132)

[SANSK 251/252] Intermediate Sanskrit (also Classics 251/252) @#
Not offered 1995-96.

CLASS 403–404 Independent Study in Sanskrit Undergraduate (also Linguistics 300)

CLASS 703–704 Independent Study in Sanskrit Graduate (also Linguistics 300)

Southeast Asia—Area Courses

[ABEN 754] Sociotechnical Aspects of Irrigation
Not offered 1995-96.

ARME 464 Economics of Agricultural Development

[ANTHR 306] Ethnographic Description
Not offered 1995-96.

ANTHR 322 Magic, Myth, Science, and Religion @

[ANTHR 334] Ethnology of Island Southeast Asia
Not offered 1995-96.

ANTHR 335 Peoples and Cultures of Mainland Southeast Asia @

ANTHR 424 Anthropology amongst Disciplines

[ANTHR 441/625] Children, Literature, and Society
Not offered 1995-96.

ANTHR 610 Myth and Mythology
Not offered 1995-96.

[ANTHR 619] Anthropological Approaches to the Study of Buddhism in Asia
Not offered 1995-96.

ANTHR 628 Political Anthropology: Indonesia
Not offered 1995-96.

ANTHR 634–635 Southeast Asia: Readings in Special Problems

GOVT 344 Government and Politics of Southeast Asia @

GOVT 652 Political Problems of Southeast Asia
Not offered 1995-96.

[GOVT 653] The Plural Society Revisited (also Linguistics 300)
Not offered 1995-96.

Southwest Asia—Language Courses

BURM 103–104 Burmese Conversation Practice

BURM 121–122 Elementary Burmese

BURM 123 Continuing Burmese

BURM 201–202 Intermediate Burmese Reading

BURM 301–302 Advanced Burmese Reading

BURM 401–402 Burmese Directed Individual Study

[CEBU 101–102] Elementary Cebuano
Not offered 1995-96.

INDO 161–162 FALCON @

INDO 121–122 Elementary Indonesian

INDO 123 Continuing Indonesian

INDO 203–204 Intermediate Composition and Conversation

INDO 205–206 Intermediate Indonesian @

[INDO 300] Linguistic Structure of Indonesian
Not offered 1995-96.

[INDO 301–302] Advanced Readings in Indonesian and Malay
Not offered 1995-96.

INDO 303–304 Advanced Indonesian Conversation and Composition

INDO 305–306 Directed Individual Study

[INDO 401–402] Advanced Readings in Indonesian and Malay Literature
Not offered 1995-96.

JAVA 131–132 Elementary Javanese
The Major

The purpose of the major in astronomy is to provide in-depth knowledge and education about the nature of the universe. Astronomy relies heavily on preparation in physics and mathematics. Consequently, many courses in these fields are included as prerequisites. In preparation for the major, a student would normally elect the introductory physics sequence Physics 112–213–214 or 116–217–218 plus Physics 316 and 318 and the complementary pathway in mathematics, Mathematics 111–122–221–222 or 191–192–293–294 (or equivalent). The sophomore seminar Astronomy 233 "Topics in Astronomy and Astrophysics" will provide an introduction to current research in astronomy and astrophysics for prospective majors, but is not required of students who elect to major in astronomy after the sophomore year. Students are also urged to acquire computer literacy. Acceptance to the major will first be considered after completion of three semesters of introductory physics and mathematics and in general will require a GPA of 3.20 in physics and mathematics courses.

The major requirements stress the importance of building a strong preparation in physical sciences. Therefore, among upper level courses are normally required:

- Physics 317, 327, 341, and 443
- Mathematics 421 and 422 (or equivalent, e.g. A&EP 321-2)
- Astronomy 410, 431, and 432.

Students are encouraged to supplement the above courses with any astronomy, physics, or other appropriate courses at or above the 400 level. Advanced seniors can enroll in astronomy graduate courses with the consent of the instructor. Students are also encouraged to work with faculty members on independent study projects (Astronomy 440). Students whose interest in astronomy is sparked somewhat late in their undergraduate careers are encouraged to discuss possible paths with the Director of Undergraduate Studies in Astronomy.

Honors. A student may be granted honors in astronomy upon the recommendation of the Astronomy Advisors Committee of the astronomy faculty.

Double majors. A double major in astronomy and another subject is possible in many circumstances. However, the set of courses used to fulfill the requirements for each major must be completely independent.

Concentration. Students majoring in other fields but interested in astronomy are encouraged to supplement their major with a concentration in astronomy, an option that is somewhat less intensive than a major. Normally Astronomy 431 and 452 are required for a concentration.

Distribution Requirement

The distribution requirement in physical sciences is met by A101 or A211, A102 or A212, 107, A201, A202 or any course numbered 300 or above. If A107 is taken, no other 100-level course can be used. Note that ASTRO 103, 104, 105, and 106 do not satisfy the distribution requirement for the College of Arts and Sciences, but may satisfy the requirements of some other college.

Courses

ASTRO 101 The Nature of the Universe

Fall. 4 credits. No prerequisites. Labs and discussions limited to 20 students each. T. Herter; labs: G. Stacey.

The history of the universe and the physical nature of existence. An examination of the universe and our place in it and the possible existence of life and intelligence elsewhere in the cosmos. The nature of stars, galaxies, and quasi-stellar sources. The birth, evolution, and death of stars and the formation of the chemical elements, including discussions of supernovae, pulsars, neutron stars, and black holes. The physical state and composition of the interstellar material and its influence on the evolution of our galaxy. An introduction to the special and general theories of relativity. The nature of time. Modern theories of cosmology and the structure and evolution of the universe.

ASTRO 102 Our Solar System

Spring. 4 credits. No prerequisites. Labs and discussions limited to 20 students each. P. Gierasch, J. Houck; labs: G. Stacey.

A survey of the current state and past evolution of our solar system, with emphasis on results from the direct exploration of planets by spacecraft. The course is divided into four parts: the theories of formation of the inner planets; the outer solar system; and the search for life in the solar system and elsewhere. Stress is placed on the important processes that have shaped the evolution of planets and satellites.

ASTRO 103 The Nature of the Universe

Fall. 3 credits.

Identical to Astronomy 101 except for omission of the laboratory (see description above). This course does not satisfy the distribution requirement in physical sciences for students in the College of Arts and Sciences.

ASTRO 104 Our Solar System

Spring. 3 credits.

Identical to Astronomy 102 except for omission of the laboratory (see description above). This course does not satisfy the distribution requirement in physical sciences for students in the College of Arts and Sciences.

ASTRO 105 An Introduction to the Universe

Summer. 3 credits.

How do we measure the size of our galaxy and the size of the universe? Is the universe round or flat? How are the stars born, why do...
they shine, and how do they die? What are the chemical elements, and how were they formed in stars? What are quasars, pulsars, and black holes? How was the solar system formed? What are the environments of other planets like? What is the basic structure of Earth and the other planets? Will we catastrophically alter the earth? Does life exist elsewhere in the universe? How can we find out? Each student has an opportunity to make observations with small telescopes.

ASTRO 106 Essential Ideas in Relativity and Cosmology
Summer. 3 credits. Prerequisites: high school algebra and trigonometry. Einstein's theories of special and general relativity, which brought about a fundamental change in our conceptual understanding of space and time, will be studied. Correspondence to, and conflicts with, common sense will be pointed out. Applications to various areas will be studied: in special relativity—space travel, equivalence of mass and energy, nuclear fission and fusion, and thermonuclear processes in the sun; in general relativity—motion of light and particles in curved space-time, cosmological models, and the question of whether the universe is open or closed.

ASTRO 107 An Introduction to the Universe
Summer. 4 credits. Identical to Astronomy 105 except for the addition of the afternoon laboratory. This course meets the science distribution requirement in the College of Arts and Sciences.

ASTRO 201 Our Home in the Universe
Fall. 3 credits. Assumes no scientific background. Preference given to freshmen and sophomores. Limited to 25 students. R. Giovannelli, M. Haynes. A general discussion of our relation to the physical universe and how our view of the universe has changed from ancient to modern times. Four themes are covered over the course of semester: (1) our view of the night sky from the ancient Greeks to the Hubble Space Telescope, (2) the search for planets and life elsewhere; (3) the death of stars and the formation of black holes, and (4) the origin, evolution, and fate of the universe. We present a nonmathematical introduction to these subjects and discuss uncertainties and unresolved issues in our understanding.

ASTRO 202 Our Home in the Solar System
Spring. 3 credits. Prerequisite: some background in science. Course intended for freshmen and sophomores. Limited to 25 students. C. Sagan. A comparison of the Earth with the other worlds in our solar system, with an emphasis on the nature and fragility of planetary environments. Topics to be discussed include the climate and weather, species extinctions, the history of climate change, evolution of the atmosphere of the Earth and other planets, ecology and biological interdependence, and threats to the current global environment—including ozone layer depletion, greenhouse warming, and nuclear winter. Possible solutions to these problems, including their economic and social costs and their ethical implications, will be considered. The course will attempt to develop skills in writing and in elementary physics and chemistry.

ASTRO 211 Astronomy: Stars, Galaxies, and Cosmology
Fall. 4 credits. Intended for engineering and physical sciences freshmen and sophomores. Prerequisite: introductory calculus or permission in Mathematics 111 or 191. G. Stacey. The formation and evolution of stars, supernovae, pulsars, quasars, and black holes. The interstellar medium. Cosmology and the structure and evolution of galaxies.

ASTRO 212 The Solar System: Planets, Satellites, and Rings
Spring. 3 credits. Prerequisite: introductory calculus or coregistration in Mathematics 111 or 191. D. Campbell, S. Squyres. The origin of the solar system; celestial mechanics; tidal evolution; the physics and chemistry of planetary surfaces, atmospheres, and satellites; interiors, planetary rings; asteroids, comets, and meteors; the search for other planetary systems.

ASTRO 223 Topics in Astronomy and Astrophysics
Fall. 2 credits. Prerequisites: Physics 112 and 213, Mathematics 112 and 221, or permission of instructor. Intended for sophomores planning to major in astronomy or related fields. M. Haynes. A seminar course on selected topics in astronomy and astrophysics designed for prospective astronomy majors. Content will vary from year to year, but will include topics from the fields of planetary, galactic, and extragalactic research.

ASTRO 331 Climate Dynamics (also SCAS 331)
ASTRO 332 Elements of Astrophysics
Spring. 4 credits. Prerequisites: calculus and Physics 213. Physics 214 strongly recommended. R. Giovannelli. An introduction to astronomy, with emphasis on the application of physics to the study of the universe. Topics include: Distance, size, mass, and age of stars, galaxies, and the universe; stellar evolution and nucleosynthesis. Supernovae, pulsars, and black holes. Galaxies and quasars. Introduction to computer programs Mainly intended for students of science, engineering and science education, interested in astronomy and astrophysics.

ASTRO 410 Experimental Astronomy
Fall. 4 credits. Prerequisites: Physics 214 (or 310 or 360), Physics 325 (coregistration preferred) or permission of instructor. J. Cordes, P. Goldsmith, J. Houck. Observational astrophysics. Major experiments will involve techniques in CCD (charge-coupled-device) imaging, optical photography, optical spectroscopy, radiometry, radio spectroscopy and radio astronomy. The experiments involve use of the Harwood-Boothroyd Observatory's 24-inch telescope, a laboratory 2-element radio interferometer, and a radio telescope mounted on top of the Space Sciences Building. The laboratory covers the fundamentals of using astronomical instrumentation and data analysis as applied to celestial phenomena: asteroids, normal stars, supernova remnants, globular clusters, planetary nebulae, the interstellar medium and galaxies.

ASTRO 421 Introduction to Astrophysics and Space Sciences I
Fall. 4 credits. Prerequisites: mathematics above the 200 level and physics above the 300 level; co-registration in Physics 341 and 443 is recommended. D. Chernoff. An introduction to modern astrophysical concepts for physical science majors. Atomic and electromagnetic processes in space. Introduction to star formation, stellar structure and evolution, radiative transfer, and the interstellar medium. At the level of Astrophysical Concepts, by Harwit.

ASTRO 422 Introduction to Astrophysics and Space Sciences II
Spring. 4 credits. Prerequisite: Astronomy 431 or permission of instructor. G. Stacey. This course is divided into two broad topics: the astrophysics of the interstellar medium and cosmology. The interstellar medium section will cover thermal equilibrium and radiative transport in HII regions, atomic gas regions, and molecular clouds. The cosmology section will include the structure of the universe, metrics, Friedmann equations, dark matter, cosmological tests, the early universe, and the cosmological production of the elements. At the level of Astrophysics of Gaseous Nebulae and Galactic Nuclei by Osterbrock.

ASTRO 434 The Evolution of Planets
Fall. 4 credits. Not offered 1995-96. 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 considered in depth. 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.

ASTRO 440 Independent Study in Astronomy
Fall or spring. 2-4 credits. Prerequisite: permission of instructor. Recommended: familiarity with the topics covered in Astronomy 332, 431, or 434. Individuals work on selected topics. A program of study is devised by the student and instructor. Students are required to fill out an independent study form, have it signed by the instructor, and register in the department office, 510 Space Sciences Building.

ASTRO 490 Senior Seminar Critical Thinking
Spring. 3 credits. Permission of instructor required. J. Cordes, Y. Terzian. Critical thinking in scientific and nonscientific contexts. Topics will include elements of classical logic and rhetoric, including standards of evidence. Case studies will include examples of controversial hypotheses in the history of science, as well as examples from borderline science and medicine, religion, and politics. Stress will be laid on creative generation of alternative hypotheses and their winnowing by critical scrutiny.
Discussion will be both qualitative and quantitative. Students from widely diverse fields will be admitted, but are expected to be well-qualified. They will be expected to assimilate an extensive reading list; the seminar itself will be devoted to the implications of the readings and the interaction of the participants.

[ASTRO 509 General Relativity]
For description, see PHYS 553. Not offered 1995–96.

[ASTRO 510 Applications of General Relativity]
For description, see PHYS 554. Not offered 1995–96.

[ASTRO 511 Physics of Black Holes, White Dwarfs, and Neutron Stars (also Physics 525)]
Spring. 4 credits.
The formation of compact objects; neutrino and gravitational radiation from supernova collapse and neutron stars. Equilibrium configurations, equations of state, stability criteria and mass limits: the influence of rotation and magnetic fields. Pulsar phenomena. Mass flow in binary systems; spherical and disk accretion; high-temperature radiation processes. Compton scattering will be covered, as well as spectral line transfer, gas heating and cooling, and topics in atomic and molecular spectroscopy. These topics will be discussed within the framework of astrophysical situations, such as star formation, interstellar gas and dust clouds, jets, active galactic nuclei, clusters of galaxies and cosmology.

[ASTRO 515 Stellar Dynamics]
Fall. 4 credits.
An introductory survey of planetary science with an emphasis on the application of physical principles to dynamics including satellite orbits, tidal interactions, resonances, and ring dynamics. An introduction to the theory of planetary interiors, gravitational fields, heat sources, and rotational mechanics. Physics and chemistry of planetary atmospheres, including radiative transfer, convection, and thermal structure. Important observational results, including those of ground-based optical, infrared, radio, and radar astronomy, as well as those made by spacecraft, will also be discussed. Intended for students in astronomy, physics, and engineering.

[ASTRO 516 Galactic Structure and Stellar Dynamics]
Spring. 4 credits. D. Chernoff.
Global theories of the interstellar medium—mass and energy exchange between the different phases. The role of shock waves and energetic outflows in the thermal equilibrium and ionization state of gas in the galaxy. Basic astrophysical fluids and plasmas. Galactic dynamics. Observations techniques, current problems and results.

[ASTRO 517 Theory of Stellar Structure
and Evolution (also Physics 667)]
Fall. 4 credits. J. Wasserman.
Observational overview; hydrostatic equilibrium; equations of state; radiative and convective energy transport; nuclear burning; solar neutrinos; rotation and magnetic fields; stellar seismology; brown dwarfs; pre-main sequence contraction.

[ASTRO 518 Physics of the Planets]
Fall. 4 credits. P. Nicholson.
An introductory survey of planetary science with an emphasis on the application of physical principles to dynamics including satellite orbits, tidal interactions, resonances, and ring dynamics. An introduction to the theory of planetary interiors, gravitational fields, heat sources, and rotational mechanics. Physics and chemistry of planetary atmospheres, including radiative transfer, convection, and thermal structure. Important observational results, including those of ground-based optical, infrared, radio, and radar astronomy, as well as those made by spacecraft, will also be discussed. Intended for students in astronomy, physics, and engineering.

[ASTRO 519 Mechanics of the Solar System (also Theoretical and Applied Mechanics 673)]
Spring. 3 credits. J. Burns.

[ASTRO 520 Radio Astronomy]
Fall. 4 credits. D. Campbell, J. Cordes.
Radio astronomy telescopes and electronics; antenna theory; observing procedures and data analysis; concepts of interferometry and aperture synthesis.

[ASTRO 522 Signal Processing and Data Analysis in Astronomy]
Fall. 4 credits. Not offered 1995–96.
Topics will include probability theory, Fourier analysis of discrete and continuous time series, digital filtering, spectral analysis, parameter estimation, statistical inference using Bayesian methods, stochastic and chaotic processes, image formation and analysis, maximum entropy analysis, and cluster analysis. Special topics will include neural networks and genetic algorithms. Examples will be drawn from subject areas in astronomy and astrophysics, geophysics, plasma physics, and electronics.

[ASTRO 525 Techniques of Optical/Infrared and Submillimeter Astronomy]
Fall. 4 credits. Not offered 1995–96.
Optical/infrared and submillimeter telescopes and instrumentation will be discussed and related to current research in these fields. Special emphasis will be on detector elements, instrument design and construction, data analysis and observing procedures. Intended for students with a thorough understanding of undergraduate physics.

[ASTRO 530 Astrophysical Processes]
Thermal and nonthermal radiation processes encountered in studies of stars, the interstellar and intergalactic media, galaxies and quasars. Fundamentals of radiative transfer, bremsstrahlung, synchrotron radiation, and Compton scattering will be covered, as well as spectral line transfer, gas heating and cooling, and topics in atomic and molecular spectroscopy. These topics will be discussed within the framework of astrophysical situations, such as star formation, interstellar gas and dust clouds, jets, active galactic nuclei, clusters of galaxies and cosmology.

[ASTRO 555 Theory of the Interstellar Medium]
Spring. 4 credits. D. Chernoff.
Global theories of the interstellar medium—mass and energy exchange between the different phases. The role of shock waves and energetic outflows in the thermal equilibrium and ionization state of gas in the galaxy. Basic astrophysical fluids and plasmas. Galactic dynamics. Observations techniques, current problems and results.

[ASTRO 560 Theory of Stellar Structure
and Evolution (also Physics 667)]
Fall. 4 credits. I. Wasserman.
Observational overview; hydrostatic equilibrium; equations of state; radiative and convective energy transport; nuclear burning; solar neutrinos; rotation and magnetic fields; stellar seismology; brown dwarfs; pre-main sequence contraction.

[ASTRO 570 Solar Terrestrial Physics]
High-latitude ionosphere; electric fields in the polar cap and auroral zone; particle precipitation and the aurora; magnetic and ionospheric storms; plasma instabilities in the ionosphere and magnetosphere; structure and physical processes in the sun and solar wind; interactions between the solar wind and the earth's magnetosphere; trapping, acceleration, and drift of energetic particles in the magnetosphere.

[ASTRO 575 Atmospheric and Ionospheric Physics (also Electrical Engineering 586)]
Thermal and nonthermal processes encountered in studies of stars, the interstellar and intergalactic media, galaxies and quasars. Fundamentals of radiative transfer, bremsstrahlung, synchrotron radiation, and Compton scattering will be covered, as well as spectral line transfer, gas heating and cooling, and topics in atomic and molecular spectroscopy. These topics will be discussed within the framework of astrophysical situations, such as star formation, interstellar gas and dust clouds, jets, active galactic nuclei, clusters of galaxies and cosmology.

[ASTRO 576 Galactic Structure and Stellar Dynamics]
Spring. 4 credits. D. Chernoff.
Global theories of the interstellar medium—mass and energy exchange between the different phases. The role of shock waves and energetic outflows in the thermal equilibrium and ionization state of gas in the galaxy. Basic astrophysical fluids and plasmas. Galactic dynamics. Observations techniques, current problems and results.

[ASTRO 577 Cosmology]
The universe, its constituents, its large-scale structure, and its history in the light of the major thrusts of extragalactic research. The morphology, photometry, dynamics, and kinematics of galaxies and their subsystems. Determination of masses, mass-to-light ratios, and the "missing mass."

[ASTRO 578 Celestial Mechanics]
Spring. 4 credits. P. Nicholson.
This course is intended to provide a detailed theoretical development of current ideas in cosmology. Topics will include observational overview; growth of irregularities, galaxy formation and clustering; big bang cosmology, recombination, nucleosynthesis; very early universe, symmetry breaking, inflationary scenarios. At the level of Peebles, Principle of Physical Cosmology.

[ASTRO 579 Seminar: Advanced Radio Astronomy]
Spring. 2 credits.
Prerequisites: some background in extragalactic astronomy and/or radio astronomy suggested. Open to advanced undergraduates by permission of instructor. Not offered 1995–96.
Selected topics in observational cosmology at radio wavelengths including: redshift surveys, gas stripping mechanisms, rotation curves and the distributions of mass and light. High latitude structure, peculiar motions, atomic and molecular studies at high redshift, the Sunyaev-Zel'dovich effect, evolution of radio luminosity function, and the cosmic microwave background.]
BIOLOGICAL SCIENCES

P. J. Bruins, director (169 Biotechnology Building, 255-5042); H. T. Stinson, associate director and director of undergraduate studies (200 Stimson Hall, 255-5233); R. M. Sparrow, biology center coordinator (Biology Center, 216 Stimson Hall, 255-3550); M. L. Cox, executive staff assistant (200 Stimson Hall, 255-6850).

A biology is a popular subject at many universities for a variety of reasons: It is a science that is in an exciting phase of development; it prepares students for careers in challenging and appealing fields such as human and veterinary medicine, environmental sciences, and biotechnology; and it deals with the inherently interesting questions that arise when we try to understand ourselves and the living world around us. Many of the decisions we face today deal with the opportunities and problems that biology has put before us.

The major in biological sciences at Cornell is offered by the Division of Biological Sciences to students enrolled in either the College of Agriculture and Life Sciences or the College of Arts and Sciences. Student services in the division’s Office for Academic Affairs and the Behman Biology Center are available to students from either college.

The biology major is designed to enable students to acquire the foundations in physical and life sciences necessary to understand modern biology and to pursue advanced studies in a specific area of biology. Programs of study include animal physiology, biochemistry, cell biology, ecology and evolutionary biology, general biology, genetics and development, microbiology, neurobiology and behavior, and plant biology. A special program of study is available for qualified students with an interest in nutrition. Students interested in the marine sciences may consult the Cornell Marine Programs Office (214 Stimson Hall, 255-3717) for academic advice and career counseling. For more details about the biology curriculum see the section in this catalog on the Division of Biological Sciences.

BIOLOGY AND SOCIETY MAJOR

See Special Programs and Interdisciplinary Studies.

BURMESE AND CEBUANO (BISAYAN)

See Modern Languages and Linguistics.

CHEMISTRY


J. E. McMurry, director of undergraduate studies

S. T. Marcus, associate director of undergraduate studies

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 perspectives, and affords opportunities for students to participate in research.

The Standard Major

The chemistry major at Cornell provides a great deal of flexibility and prepares students for a large variety of career options. In recent years, chemistry majors have gone on to graduate study in chemistry, medicine, law, and business management, as well as directly into positions with chemical, pharmaceutical, and other industrial companies. A major in chemistry can also provide the basis for work in related areas such as molecular biology, chemical physics, geochemistry, chemical engineering, materials science, solid state physics, and secondary education. The required courses for the major can be completed in three years, leaving the senior year open for advanced and independent work under the supervision of a professor.

The courses are arranged as a progression, with some (including mathematics and physics) prerequisites to those that are more advanced. During the first year, a student should normally register for general chemistry (preferably Chemistry 215–216 although Chemistry 207–208 is acceptable), mathematics, a freshman writing seminar, a foreign language if necessary, or physics. Chemistry 215–216 is aimed at those students with good preparation and a strong interest in chemistry. Students who do not know if their preparation is adequate should consult the instructor. In the second year a student should complete calculus and take physics and organic chemistry (Chemistry 350–360 is preferred to Chemistry 357–358). The second-year laboratory courses are Chemistry 370, Quantitative Chemistry, if needed, and 301, Experimental Chemistry I. Chemistry 389–390, Physical Chemistry I and II, and Chemistry 302–303, Experimental Chemistry II and III, should be completed in the third year. Chemistry 410 should be completed in the third or fourth year. Advanced work in chemistry and related subjects can be pursued in the fourth year and in the earlier years as well. The opportunity for independent research is also available. All students with questions about the major are encouraged to consult the chair of the Department of Chemistry or the chair's representative. Entering students who are exceptionally well prepared in chemistry may receive advanced placement credit for Chemistry 207.

Prerequisites for admission to a major in chemistry are (1) Chemistry 215–216; or 207–208; 300, or 211–208, 300, or 103, 208, 300; (2) Physics 207 or 112; and (3) Mathematics 111 or 191. Students are not encouraged to undertake a major in chemistry unless they have passed those prerequisite courses at a good level of proficiency. Knowledge of
simple computer programming is desirable. This may be achieved either by self-study (a syllabus is available) or by taking a course such as Computer Science 100. The minimum additional courses that must be completed for the standard major in chemistry are listed below.

1) Chemistry 301–302–303, 359–360 (357–358 may be substituted), 389–390, and 410
2) Mathematics 112, 213; or 122, 221–222; or 192–293–294
3) Physics 208

Potential majors electing to take Mathematics 213 are strongly urged to do so in their sophomore year to avoid scheduling conflicts with Chemistry 389 in their junior year.

The sequence described above is a basic program in chemistry that students can extend substantially in whatever direction suits their own needs and interests. Those going on to do graduate work in chemistry should recognize that these requirements are minimal and should supplement their programs, where possible, with further courses such as Chemistry 405, 605, 606, 666, 668, and 681. Even students not planning graduate work in chemistry should consider advanced work in physics and mathematics, courses in the biological sciences, and advanced work in chemistry as possible extensions of the basic program.

Honor. The honors program in chemistry offers superior students in the standard major, 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, although, 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, with selection based on a superior cumulative average, including chemistry grades, and good performance in a prior research program. Prospective candidates should discuss their plans with advisers by March 1 of their junior year; participants are notified by early April of their junior year to avoid scheduling conflicts.

The Alternative Major

The alternative major is a flexible program that provides core coverage of chemistry around which students can design a program to meet their own career goals. Requirements consist of a core program along with four additional courses chosen by the student. One of the four must be in chemistry at the 300 level or above; the other three may be in another field but should represent a cohesive plan and must be approved by a departmental committee. Students who select the alternative major are not eligible for the honors program.

The Core Program for the Alternative Major

1) Chemistry 215–216 (or 207–208, 300; or 211, 208, 300; or 103, 208, 300), 253, 251, 287, 289, and 410 (Chem 357–358 or 359–360 can be substituted for Chem 255, or Chem 395–390 can be substituted for Chem 287; thereby fulfilling the requirement for an additional chemistry course)
2) Mathematics 111–112, or 111, 122, or 191–192
3) Physics 207–208; or 112, 213

Additional Courses for the Alternative Major

Possible plans for the remaining three courses might include programs in Biochemistry; Biology, Physics, Computer Science; Polymers; Materials Science; Science, Technology, and Society; History and Philosophy of Science and Technology; Business and Management; Economics; Education; and others.

Premedical students and those interested in pursuing double majors might find the alternative major attractive. The course requirements for admission to the alternative major are the same as those for the standard major.

Program for Science Teachers

Chemistry majors who wish to become teachers will be interested to know that Cornell University offers a certification program for teachers of secondary (grades 7–12) science. Interested students apply to the program during their sophomore or junior years. If accepted, students integrate some course work in Education with the rest of their undergraduate studies. All chemistry majors who enter this program will remain in the College of Arts and Sciences to complete the major.

After earning the bachelor's degree, certification students enter the Graduate Field of Education to complete a fifth year of study at Cornell. Following this fifth year, students are eligible for a master's degree from Cornell and a teaching certificate from New York State. Additional information is available from Russie Slack, 424 Kennedy Hall, 255-9255 or Prof. Deborah Triennull, 426 Kennedy Hall, 255-5108.

Laboratory Course Regulations

Students registered for laboratory courses who do not appear at the first meeting of the laboratory will forfeit their registration in that course.

Students and members of the teaching staff are required to wear safety goggles and lab aprons in all chemistry laboratories. Close-toed footwear is required (no sandals). Students are required to take their goggles and lab aprons to the first laboratory session. Those who fail to cooperate with the safety program will be asked to leave the laboratories.

Students are required to pay for glassware and any other items broken or missing from their laboratory desk by the close of each semester. Students who fail to inventory their desks at the appointed time in the presence of their instructor are charged a $10 fee in addition to charges for any breakage.

Courses

Note: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

Preliminary examinations for all courses may be given in the evening.

CHEM 103 Introduction to General Chemistry

Fall or summer. 4 credits. Enrollment limited. Recommended for students who have not had high school chemistry and for those needing a less intensive course than Chemistry 207–208. Lecs, M W F 11:15; lab, T R or F 8:00-11:00, or M W or F 1:25–4:25. Prelims: 7:30–9 p.m., Oct. 12, Nov. 16. D. Y. Sogah.

An introduction to general chemistry, with emphasis on important principles and facts. Chemistry 103 covers much of the same material as Chemistry 207 and the first third of Chemistry 208, but does so in less depth.

CHEM 104 Introduction to Organic and Biological Chemistry

Spring or summer. 3 credits. Enrollment limited. Prerequisite: Chemistry 103 or 207. Lecs, M W F 11:15; lab, T R or F 8:00–11:00, or M W or F 1:25–4:25. Prelims: 3:30–9 p.m, Feb. 27, April 11. J. Meinwald.

An introduction to organic and biological chemistry, with emphasis on important reactions of organic compounds and on the applications of those reactions in biological systems.

CHEM 203 Strategies in Science: The World of Chemistry

Spring. 3 credits. This course plus Chemistry 103, 204, or 207 or 211 satisfies the College of Arts and Sciences physical science distribution requirement. Chemistry 203 also satisfies the C.A.L.S. physical science requirement of one course in chemistry. S-U or letter grades. Lecs, M W F 1:25. Prelims: 7:30–9 p.m., Feb. 27, April 2. F. J. DiSalvo.

A general appreciation of chemistry in the everyday world which will highlight for nonscientists the way the scientific method works. Using several case studies, the course will focus not only on what modern chemistry has accomplished, but also generally on how the way scientists think, how they function, what their modus operandi is. Selected topics include (a) the chemistry of food, food additives, and the effect of diet on health; (b) drugs and medicines; (c) air and water pollution, pesticides, herbicides, acid rain, and other environmental chemistry; (d) the chemistry of plastics, polymers, and other modern materials; (e) the chemistry of taste and smell, including flavors, perfumes, and cosmetics; and (f) biotechnology and genetic chemistry. Other topics to be discussed are the influence of the media on scientific issues, the decision-making process in science, scientific publishing, and fraud in science.

CHEM 204 The Language of Chemistry

Fall. 3 credits. This course contributes to meeting the College of Arts and Sciences "Physical and Biological Sciences" (Group D) distribution requirement, as well as the C.A.L.S. physical science requirement of one course in chemistry. S-U or letter grades. Lecs, M W F 12:20. Prelims: 12:20 p.m. Sept. 22, Oct. 25. J. Meinwald.

In his autobiography, A. Kornberg (Nobel Laureate in Medicine, 1959) wrote, "much of
life can be understood in rational terms if expressed in the language of chemistry. It is an international language, a language for all time, a language that explains where we came from, what we are, and where the physical world will allow us to go.* Through careful examination of a few milestone investigations of naturally occurring biologically important compounds (such as the antimalarial quinine, taxol, nicotine, and the sperm attractants of algae), the principles of chemistry to which Kornberg refers will be developed. Methods of analyzing problems will be emphasized, rather than the memorization of specific results or formulas. There will be an opportunity for students, working in small groups, to prepare and present short reports on topics of particular current interest at the interface between chemistry and biology.

**CHEM 207-208 General Chemistry**
207, fall or summer; 208, spring or summer. 4 credits each term. Enrollment limited. Prerequisite: for those students who will take further courses in chemistry. Prerequisite for Chemistry 207: high school chemistry. Prerequisite for Chemistry 208: Chemistry 207 or 103.


The fundamental chemical principles and descriptive facts are covered, with considerable attention given to the quantitative aspects and to the techniques important for further work in chemistry. Second-term laboratory includes a systematic study of qualitative analysis.

Note: Entering students exceptionally well prepared in chemistry may receive advanced placement credit for General Chemistry by demonstrating competence in the advanced placement examination of the College Entrance Examination Board or in the departmental examination given at Cornell before classes start in the fall.

**CHEM 211 Chemistry for the Applied Sciences**

The important chemical principles and facts are covered with the objective of understanding the role of chemistry in other fields. Emphasis is on topics such as solid-state materials, periodic trends, and specific classes of compounds, such as polymers.

Note: Entering students exceptionally well prepared in chemistry may receive advanced placement credit for General Chemistry by demonstrating competence in the advanced placement examination of the College Entrance Examination Board or in the departmental examination given at Cornell before classes start in the fall.

**CHEM 215-216 General and Inorganic Chemistry**

An intensive systematic study of the laws and concepts of chemistry, with considerable emphasis on quantitative aspects. Second term includes systemsatics of inorganic chemistry. Laboratory work covers both qualitative and quantitative analysis.

**CHEM 221 Molecular Messengers in Nature**
Spring. 3 credits. Prerequisite: one year of high school chemistry, Chemistry 103 or 207, or permission of instructor. Not offered 1995-96.

Organisms communicate with one another in nature chiefly by means of chemical signals. We will examine this intriguing mode of communication as it applies to a wide variety of species ranging from bacteria to insects and mammals, including humans. Essential concepts of organic chemistry and biology will be introduced and illustrated. Each student will be expected to prepare a term paper, and there will be an opportunity for oral presentation of some of these papers for class discussion.

**CHEM 251 Introduction to Experimental Organic Chemistry**
Fall, spring, or summer. 2 credits. Recommended for non-chemistry majors. Enrollment limited. Prerequisites: coregistration in Chemistry 253 or 357.

Lecs: Fall, R 8:00; spring, F 8. (all students attend the first lecture); lab, M T W R F 8-12:45, or T or R 8-11. Prelims: 7:30-9 p.m., Fall: Nov. 9, Spring: 8:00 a.m. Day to be announced. Fall: S. Russo; Spring: S. Russo.

Introduction to the synthesis, separation, and handling of materials, including applications of many types of chromatography, simple and fractional distillation, crystallization, extraction, and others.

**CHEM 252 Elementary Experimental Organic Chemistry**
Spring or summer. 2 credits. Recommended for non-chemistry majors. Prerequisite: Chemistry 251. Lecs, M 8:00; Lab, M T W R or F 1:25-4:25, or T or R 8-11. Prelims: 8:00 a.m. Day to be announced. S. Russo.

A continuation of Chemistry 251.

**CHEM 253 Elementary Organic Chemistry**
Fall or summer. 4 credits. Primarily for students in the biological curricula.


The occurrence and properties of organic molecules and the mechanisms of organic reactions, including a brief introduction to the organic chemistry of biological systems.

Note: Because of duplication of material, students are not permitted to earn both 4 credits for Chemistry 253 and 3 credits for Chemistry 357. In special situations (consult instructor for details), students should take Chemistry 255 for 2 credits after having earned 3 credits for Chemistry 357. Students may earn 6 credits by taking Chemistry 251-253 or 8 credits by taking Chemistry 357, 358 and 251 or 253, 251, and 252.

**CHEM 255 Elementary Organic Chemistry**
Fall or summer. 2 credits. Same course as Chemistry 253, but to be taken for reduced credit by students already having 3 credits for Chemistry 357.

**CHEM 267-268 Introductory Physical Chemistry**
267, fall, 268, spring. 3 credits each term. Prerequisites: Chemistry 208 or 216 and Mathematics 111-112, or permission of instructor. Prerequisite for Chemistry 268: Chemistry 287 or 389. Lecs, M W F 9:05-10; rec, M or W 9:05-10; Prelims: T 7:30-9 p.m., 287: Oct. 5, Nov. 9, Dec. 5. 288: Feb. 15, March 28, April 25. Fall: J. H. Freed; Spring: B. A. Baird.

A systematic treatment of the fundamental principles of physical chemistry, focusing in the fall on thermodynamics and the quantum mechanics of the periodic table and chemical bonding. In the spring the course will be oriented to the application of physical chemistry to biological systems, including mass transport, kinetics, spectroscopy, and probability. Chemistry 287 satisfies the minimum requirement for physical chemistry in the alternative chemistry major.

**CHEM 289-290 Introductory Physical Chemistry Laboratory**
289, fall, 290, spring. 2 credits each term. Prerequisites: Chemistry 208 or advanced placement in chemistry. Lec, R 10:10; lab, M T W R F 12:20-4:25 or T 8-12. Prelims: 7:30-9 p.m., Nov. 16. J. M. Burlitch.

Gravimetric, volumetric, spectrophotometric, and potentiometric methods are emphasized. Techniques are learned by analysis of knowns and then are used on unknowns. Lectures and problem sets stress the relationship between theory and applications.

**CHEM 301 Quantitative Chemistry**
Fall. 2 credits. Prerequisite: Chemistry 208 or advanced placement in chemistry. Lec, R 10:10; lab, M T W R F 12:20-4:25 or T 8-12. Prelims: 7:30-9 p.m., Nov. 16. J. M. Burlitch.

**CHEM 301 Experimental Chemistry I**
Spring, 4 credits. Prerequisites: Chemistry 216 or 300, and 253 or 357 or 359. Lecs, M W F 8:00; 2 labs, M W 1:25-4:25 or T R 8-11 or T R 1:25-4:25. Prelims: 8:00 a.m. March 6. D. A. Usher.

An introduction to the techniques of synthetic organic chemistry. A representative selection of the most important classes of organic reactions will be explored in the laboratory. The theoretical basis for these reactions and for the separation techniques used will be discussed in the lectures.
CHEM 302 Experimental Chemistry II
Fall. 4 credits. Enrollment limited; preference given to chemistry majors. Prerequisites: Chemistry 301. Lecs, M W F 9:05; 2 labs, M W 1:25-4:25, T R 8-11 or T R 1:25-4:25. M. A. Hines. Instrumental methods of analysis, including optical spectroscopy, atomic absorption, NMR, gas chromatography, and electrochemical methods.

CHEM 303 Experimental Chemistry III
Spring. 4 credits. Each lab limited to 11 students. Prerequisites: Chemistry 302, 389, 390; coregistration in the latter is permissible. Lecs, M W F 9:05; 2 labs, M W 1:25-4:25, or T R 9:00-12 or T R 1:25-4:25. M. A. Hines. An introduction to measurement strategies in physical chemistry as applied to kinetics, spectroscopy, the dynamics of photo-excited states, and the dielectric properties of matter. The principles and assembly of electronic, optic, computer, and vacuum line equipment will be studied.

CHEM 357-358 Introductory Organic Chemistry
357, fall: 358, spring. 3 credits each term. Prerequisite for Chemistry 357: Chemistry 208 or 210 or advanced placement, recommended: concurrent registration in Chemistry 251 or 300. Prerequisite for Chemistry 358: Chemistry 357; recommended: concurrent registration in Chemistry 252 or 301. Lecs, M W F 9:05 or 10:15, optional rec may be offered. Prereqs: 7:30-9 p.m., Sept. 26, Oct. 24, Nov. 21, Feb. 15, March 14, April 16. Fall: J. M. J. Frechet; spring: J. E. McMurry. A systematic study of the more important classes of carbon compounds—reactions of their functional groups, methods of synthesis, relations, and uses.

Note: Because of duplication of material, students are not permitted to earn both 4 credits for Chemistry 253 and 3 credits for Chemistry 358. In special situations (consult instructor for details), students should take Chemistry 255 for 2 credits after having earned 3 credits for Chemistry 357. Students will not be permitted to take Chemistry 358 after completing Chemistry 253.

CHEM 359-360 Organic Chemistry I and II
359, fall; 360, spring. 4 credits each term. Recommended for students who intend to specialize in chemistry or closely related fields. Enrollment limited. Prerequisites: Chemistry 216 with a grade of B or better, Chemistry 210 or advanced placement, recommended: concurrent registration in Chemistry 251 or 300. Prerequisite for Chemistry 360: Chemistry 359. Recommended: coregistration in Chemistry 300–301–302. Lecs, M W F 9:05; 2 labs, M W 1:25-4:25, or T R 9:00-12 or T R 1:25-4:25, Sept. 27, Oct. 20, Nov. 20, Feb. 21, Apr. 5. Fall: J. C. Clardy; spring, T. P. Begley. A rigorous and systematic study of organic compounds, their structures, the mechanisms of their reactions, and the ways they are synthesized in nature and in the laboratory.

CHEM 389-390 Physical Chemistry I and II
389, fall; 390, spring. 4 credits each term. Prerequisites: Mathematics 213 or, ideally, 221–222; Physics 208; Chemistry 208 or 210 or permission of instructor. Prerequisite for Chemistry 390: Chemistry 389. Lecs, 389: M W F 10:10; rec M or W 1:25 or T 9:05. Lecs, 390: M W F 10:10; prelims: 7:30-9 p.m. 389: Oct. 5, Nov. 9, Dec. 5. 390: Feb. 16, March 12, April 16. Fall: G. S. Ezra; spring: 390: R. Loring. The principles and uses of physical chemistry as applied to kinetics, thermodynamics, statistical mechanics, and quantum chemistry.

CHEM 391 Physical Chemistry II
Spring. 4 credits. Enrollment limited to engineering students only. Prerequisites: Mathematics 293; Physics 112, 213; Chemistry 208 or 216 or permission of instructor. Co-requisite: Math 294. Prerequisite for Chemistry 391: Chemistry 389. Lecs, M W F 9:05; rec M or T 9:05; prelims: 7:30-9 p.m. Feb. 20, Mar. 12, Apr. 25. T. M. Duncan. The principles of physical chemistry are studied from the standpoint of the laws of thermodynamics, kinetic theory, statistical mechanics, and quantum chemistry.

CHEM 405 Techniques of Modern Synthetic Chemistry
Spring 3 or 6 credits. Enrollment limited. Prerequisites: Chemistry 302 and permission of instructor. To receive three credits, students must perform a minimum of three two-week experiments. Six credits will be given for three additional experiments. Completion of five exercises in elementary glass-blowing will count as one experiment. Lab time required: 16 hours each week, including at least two 4-hour sessions in one section (M W 1:25). First meeting will be at 1:30 on first class day of semester. Lec, first week only, at 9:00 a.m., first day of semester. Lee, first week only, at 9:00 a.m., first day of semester.

CHEM 410 Inorganic Chemistry
Fall. 4 credits. Prerequisites: Chemistry 253, 358 or 360, and 287 or 390. Lecs, M W F 9:05 or 10:15. A systematic study of the synthesis, structure, bonding, reactivity and uses of inorganic molecular and solid state compounds.

CHEM 421 Introduction to Inorganic Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 303 and 389–390, or Chemistry 287-288 or 289-290 or 298-299 with an average of B- or better, or permission of instructor. Selected faculty. Research in inorganic chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 422 Introduction to Analytical Chemistry Research
Fall or spring. 2–4 credits. Prerequisites: Chemistry 303 and 390 with an average of B- or better permission of instructor. Selected faculty. Research in analytical chemistry involving both laboratory and library work, planned in consultation with a faculty member.

CHEM 498 Honors Seminar
Spring. No credit. Admission to standard chemistry majors only by departmental invitation. Additional prerequisites or corequisites: outstanding performance in either (1) two coherent 4-credit units of research in a course such as Chemistry 421, 433, 461, or 477; or (2) one 4-credit unit in a course such as Chemistry 241, 433, 461, or 477 and summer research equivalent to at least 4 credits in the same subject. M 2:30-4. B. Gamem. Informal presentations and discussions of selected topics in which all students participate. Individual research is on advanced problems in chemistry or a related subject under the guidance of a faculty member, culminating in a written report.

CHEM 600-601 General Chemistry Colloquium
600, fall; 601, spring. No credit. Required of all graduate students except those majoring in organic or biocorganic chemistry. Juniors and seniors are encouraged to attend. R 11:15. Fall: R. Loring; spring: J. H. Freed. A series of talks representative of all fields of current research interest in chemistry other than organic chemistry, given by distinguished visitors and faculty members.

CHEM 605 Advanced Inorganic Chemistry I: Symmetry, Structure, and Reactivity
Fall. 4 credits. Prerequisite: Chemistry 389–390 or equivalent or, permission of instructor. Lecs, T R 8:40–9:55. R. C. Fay. Selected topics in structure, bonding, and reactivity of inorganic compounds with emphasis on main group elements; at the level of Chemistry of the Elements, by Greenwood and Earnshaw. Group theory applications: hybrid orbitals, molecular orbitals, molecular vibrations, and ligand field theory; at the level of Cotton's Chemical Applications of Group Theory.

CHEM 606 Advanced Inorganic Chemistry II: Structure, and Reactivity of Inorganic and Organotransition Metal Compounds
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CHEM 607 Advanced Inorganic Chemistry II: Solid-State Chemistry
Fall. 4 credits. Prerequisite: Chemistry 605 or permission of instructor. Not offered 1995-96.

CHEM 622 Chemical Communication
For description, see BIONB 622. Not offered 1995-96.

CHEM 625 Advanced Analytical Chemistry I
Fall. 4 credits. Prerequisite: Chemistry 288 or 390 or equivalent. Lecs, M W F 9:05; occasional prelms W 7:30 p.m. C. F. Wilcox.
The fundamentals of molecular spectroscopy to chemical problems. Topics in infrared, NMR, and mass spectroscopy are discussed.

CHEM 627 Advanced Analytical Chemistry II
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or Chemistry 208 and Mathematics 112, or permission of instructor. Offered alternate years. Lecs, T R 10-11:10. J. T. Brenna.
Modern trace, micro, and surface methods of analysis, including atomic spectroscopy, solids mass spectrometry, high precision isotope ratio analysis, Fourier transform spectroscopy, microprobe, and electron spectroscopy. Applications to biological and solid state problems.

CHEM 628 Trace Element and Isotopic Analysis (also Nutritional Sciences 620)
Spring. 3 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390, or Chemistry 208 and Mathematics 112, or permission of instructor. Offered alternate years. Lecs, T R 10-11:10. D. A. Usher.
Modern trace, micro, and surface methods of analysis, including atomic spectroscopy, solids mass spectrometry, high precision isotope ratio analysis, Fourier transform spectroscopy, microprobe, and electron spectroscopy. Applications to biological and solid state problems.

CHEM 650 Organic and Organometallic Chemistry Seminar
Spring, fall; 651, spring. No credit. Required of all graduate students majoring in organic or biorganic chemistry. Juniors and seniors are encouraged to attend.
A series of talks representative of all fields of current research interest in organic and organometallic chemistry, given by research associates, faculty members, and distinguished visitors.

CHEM 655 Advanced Organic Chemistry
Fall. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisites: Chemistry 253 or 358 or 360, and 390 or equivalents or permission of instructor. Lecs, M W F 12:20. B. K. Carpenter.
A survey of reaction mechanisms and reactive intermediates in organic chemistry.

CHEM 665 Synthetic Organic Chemistry
Spring. 4 credits. Primarily for graduate students and upperclass undergraduates. Prerequisite: Chemistry 655 or permission of instructor. Lecs, T R 10:10-11:25.
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 synthesis design.

CHEM 666 Chemical Aspects of Biological Processes
Fall. 4 credits. Prerequisite: Chemistry 360 or equivalent. Lecs, T R 10-11:30, and occasionally, M 6 p.m. D. A. Usher.
A representative selection of the most important classes of enzyme-catalyzed reactions will be examined from a mechanistic perspective. Topics discussed will include the chemical basis of enzymatic catalysis, techniques for the elucidation of enzyme mechanism, cofactor chemistry, and the biosynthesis of selected natural products. The application of chemical principles to understanding biological processes will be emphasized.

CHEM 670 Fundamental Principles of Polymer Chemistry
Fall. Prerequisite: Physical Chemistry 389/390 and Organic Chemistry 359/360 or equivalent or by permission of instructor. Primarily for graduate students and advanced undergraduates. No previous knowledge of polymers is required. Not offered 1995-96.
This course emphasizes general concepts and fundamental principles of polymer chemistry. The first part of the course deals with general introduction to classes of polymers, molar masses and their distributions, and a brief survey of major methods of polymer synthesis—step growth, ionic, group transfer, Ziegler-Natta and metathesis polymerization methods—with emphasis on kinetics and mechanisms rather than on structure. The second part deals with characterization and physical properties. These include solution properties—solubility and solubility parameters, solution viscosity, molecular weight characteristics, gel permeation chromatography, viscometry, light scattering, small angle x-ray scattering, thermal and mechanical properties; and structure-property relationships. The discussions will focus on chemistry rather than engineering of polymers.

CHEM 671 Synthetic Polymer Chemistry (also Materials Science and Engineering 671 and Chemical Engineering 675)
Spring. 4 credits. Prerequisite: Chemistry 359-360 or equivalent or permission of instructor; recommended: Materials Science and Engineering 620. Lecs, T R 8:30-10:00. D. Sogah.
Modern concepts in synthetic polymer chemistry. The application of organic synthesis to the development of new polymers and copolymers and the control of their architecture. Chain and step-growth polymerizations, reactions of polymers, block and graft copolymers. A broad spectrum of applications from recent literature will also be discussed.

CHEM 672 Protein Kinetics
Fall. 4 credits. Primarily for graduate students in Chemistry and Biochemistry. Prerequisite: Chemistry 390, Biological Sciences 351, or equivalent or permission of instructor. Lecs, M W F 10:10.
B. A. Baird.
Focus is on protein interactions with ligands and consequent changes in structure and activity. Topics include: protein structure and dynamics; thermodynamics and kinetics of ligand binding; steady state and transient enzyme kinetics; enzyme catalysis and regulation; role of cell membrane receptors in regulating cellular activities.

CHEM 677 Chemistry of Nucleic Acids
Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 358 or 360, and 350 or equivalents. S-U grades only. Lecs, M W 10-11:10. D. A. Usher.
Properties, synthesis, reactions, and biochemical reactions of nucleic acids.

CHEM 678 Statistical Thermodynamics
Fall. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalents. Lecs, M W F 9:05.
F. Davis.

CHEM 681 Physical Chemistry III
Fall. 4 credits. Prerequisites: Chemistry 288 or 390, Mathematics 213 and Physics 208, or equivalents. Not offered 1995-96.
An introduction to the principles of quantum theory and statistical mechanics, atomic and molecular spectra, and elementary valence theory. At the level of Quantum Chemistry, by Levine.

CHEM 686 Physical Chemistry of Proteins
Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 288 or 390 or equivalents. S-U grades. Letter grades for undergraduates. Offered alternate years. Not offered 1995-96.
Chemical constitution, molecular weight, and structural basis of proteins; thermodynamic, hydrodynamic, optical, spectroscopic, and electrical properties; protein and enzyme reactions; statistical mechanics of helix-coil transition in biopolymers; conformation of biopolymers; protein folding.

CHEM 700 Baker Lectures
Fall, on dates to be announced. No credit.
Distinguished scientists who have made significant contributions to chemistry present lectures for periods varying from a few weeks to a full term. This year's lecturer: Graham Fleming, Univ. of Chicago, Chicago, Illinois.
Particular attention is devoted to methods of chemical mechanisms and the properties of reactive techniques to studies of organic reaction engineering of polymers and examples will be discussed. The focus will be on chemistry rather than polymer solubility. Mechanical and Thermal Molecular weight characterization and Stereochemistry. Solution properties: Kinetics and mechanisms of Polymerization Introduction to polymer physical chemistry. Characterization techniques of dilute solutions: osmometry, light scattering, viscometry, and sedimentation. Rubber elasticity; mechanical and thermodynamic properties of gels. Polymer metal-co. equations of state and glass transition phenomenon.


Introduction to polymer physical chemistry. Kinetics and mechanisms of Polymerization methods: Ionic, radical, step-growth, and group transfer polymerization. Polymer Stereochemistry. Solution properties: Molecular weight characterization and polymer solubility. Mechanical and Thermal Properties. Structure-Property Relations. The discussions will focus on chemistry rather than engineering of polymers and examples will be taken from current literature.

Applications of classical and experimental techniques to studies of organic reaction mechanisms and the properties of reactive intermediates.

Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 665 or permission of instructor. Lecs, M W F 10:10. B. K. Carpenter.

Chemical Kinetics

Applications of nuclear magnetic resonance, and other spectroscopies, to problems of structure and dynamics in solids.

CHEM 780 Principles of Chemical Kinetics

Fall. 4 credits. Prerequisite: Chemistry 681 or permission of instructor. Lecs, T R 10:10-11:25. P. G. Hougen. Principles and theories of chemical kinetics; special topics such as surface reactions, photochemistry, enzymatic reactions, energy transfer, and molecular beams.

CHEM 782 Special Topics in Biophysical and Bioorganic Chemistry

Spring. 4 credits. Prerequisite: Chemistry 288 or 390 or permission of instructor. Offered alternate years. Lecs, M W F 10:10. J. Clardy. A beginning course in the application of X-ray crystallography to chemistry. Topics include symmetry properties of crystals, diffraction of X-rays by crystals, interpretation of diffraction data, and refinement of structures. The chemical information from a diffraction experiment is stressed, and practical aspects are incorporated by conducting an actual structure determination as a classroom exercise.

CHEM 789 X-ray Crystallography

Spring. 4 credits. Prerequisite: Chemistry 288 or 390 or permission of instructor. Offered alternate years. Lecs, M W F 10:10. J. Clardy. A beginning course in the application of X-ray crystallography to chemistry. Topics include symmetry properties of crystals, diffraction of X-rays by crystals, interpretation of diffraction data, and refinement of structures. The chemical information from a diffraction experiment is stressed, and practical aspects are incorporated by conducting an actual structure determination as a classroom exercise.

CHEM 791 Spectroscopy

Spring. 4 credits. Prerequisite: Chemistry 793 or Physics 443 or equivalent. Lecs, M W F 10:10. A. C. Albrecht. The course will explore the interaction of light with matter. We will start with the quantum mechanical foundations of spectroscopy and follow with a detailed treatment of a variety of different spectroscopic techniques including the study of rotation, vibration, and electronic spectra of polyatomic molecules. As time and interest allow, we will cover special topics such as non-linear spectroscopies and the molecular symmetry group.

CHEM 792 Molecular Collision Theory

Spring. 4 credits. Offered 1995-96. Lecs, T R 10:10-11:25. G. S. Ezra. The concepts and methods of scattering theory are described with particular emphasis on applications to problems of chemical interest. At the level of Child's Molecular Collision Theory and Taylor's Scattering Theory.

CHEM 793 Quantum Mechanics I

Fall. 4 credits. Prerequisites: Chemistry 390, coregistration in A&EP 321 or equivalents or permission of instructor. Lecs, M W F 11:15. R. Loring Schrodinger's equation, wave packets, uncertainty principle, WKB theory, matrix mechanics, orbital and spin angular momentum, exclusion principle, perturbation theory, variational principle. At the level of Cohen-Tannoudji's Quantum Mechanics.

CHEM 794 Quantum Mechanics II

Spring. 4 credits. Prerequisites: Chemistry 793 or equivalent and the equivalent of or coregistration in Physics 432 and Mathematics 422, or permission of instructor. Lecs, M W F 9:05. G. S. Ezra. Quantum structure of atoms and molecules. Time-dependent phenomena in quantum mechanics and light/matter interaction. Spectroscopies. Group theory. At the level of Weissbluth's Atoms and Molecules, Levine's Quantum Chemistry, and Sakurai's Modern Quantum Mechanics.

CHEM 796 Statistical Mechanics

Spring. 4 credits. Primarily for graduate students. Prerequisite: Chemistry 678 and 793 or equivalent. Lecs, T R 8:30-9:50. B. Widom. Statistical mechanics of systems of interacting particles. Structure and thermodynamics of classical liquids. Phase transitions and critical phenomena. This course provides a survey of topics in modern statistical mechanics.

CHEM 798 Special Topics in Physical Chemistry

Spring. 4 credits. Prerequisite: Chemistry 681 or 688, or 793, or Physics 443, or the equivalent. Lecs, T R 10:10-11:25. R. Hoffmann.

CHINESE

See Modern Languages and Linguistics.


CLASSICS


Cornell University has long recognized the importance of studying the civilizations of ancient Greece and Rome. Particularly in an age of increasing specialization, study of the Classics is widely viewed as an excellent means of acquiring a liberal education; at Cornell, we are deeply interested in the continuing humanistic values contained in the literature of the ancient world and in gaining a fuller understanding of these important cultures and their imprint upon subsequent ages.

The Department of Classics at Cornell is one of the oldest and largest in the country. With nineteen faculty members, together with professors of related interests in the departments of History, Philosophy, Comparative Literature, History of Art, Modern Languages and Linguistics, and Near Eastern Studies and in the Archaeology, Medieval Studies, and Religious Studies programs, the range of instruction available is very large, including not only the traditional study of language, literature, and ancient history, but also newer developments in the field, such as comparative study of Mediterranean civilizations and modern literary theory.

Although Classics, like other areas of humanistic study, does not aim at providing specific preprofessional training, over the years Classics majors from Cornell have gone on to a wide variety of careers: in law, teaching, medicine, diplomacy, management, educational administration, government, and many others.
Honors

Candidates for the degree of Bachelor of Arts with honors in Classics, Greek, Latin, or Classical civilization must fulfill the requirements of the appropriate major study as given above and must also successfully complete the special honors courses 370, 471, and 472. Credit for honors courses may be included in the credits required for the major study. Students who wish to become candidates for honors, who have a cumulative average of B+ or better, and who have demonstrated superior performance in Classical courses (Greek, Latin, and Classical Civilization), submit an outline of their proposed honors work to the honors committee during the first month of their fifth semester. The chair will appoint a committee of three faculty members for each candidate, and the committee will be responsible for evaluating the candidate's proposal and subsequently supervising his or her work. At the completion of the honors thesis, which must demonstrate knowledge of the main bibliographical sources, give promise of scholarly talent, and show creativity, the committee will determine the level of honors to be awarded.

Study Abroad

Cornell participates in the Intercollegiate Center for Classical Studies in Rome, which offers courses in Latin, Greek, ancient history, art, archaeology, and Italian. Another opportunity for a semester's study abroad is available through Cornell Abroad in Greece at the Athens Centre. (Consult Cornell Abroad for details.) In addition, Cornell is a member institution of the American School of Classical Studies at Athens. Participation is open to graduate students and qualified undergraduates. The American Academy in Rome, of which Cornell is also a member institution, offers full-year and summer programs for qualified graduate students. For graduate students the Department of Classics offers a few travel grants each year from the Townsend Memorial Fund. Detailed information on these programs is available in the Department of Classics Office, 120 Goldwin Smith Hall.

Summer Support for Language Study

The Beatrice R. Kanders Memorial Scholarship (for the summer immediately following the freshman or sophomore year; preference given to dyslexic students) and a certain amount of tuition aid made possible by gifts from the Constaninios C. Polychronis Foundation are normally available to students who want to enroll in Intensive Latin or Greek in the Cornell summer session. These courses are designed to enable students to enter second-year Latin or Greek the following fall. Preference is given to Classics undergraduate majors, and other students needing Latin or Greek for completion of their major. Applications are due to the chair of the Department of Classics by March 22.

Placement in Latin, Ancient Greek, and Modern Greek

Placement of first-year students in Latin, ancient Greek, and modern Greek courses is determined by an examination given by the Department of Classics during orientation week or by arrangement with the director of undergraduate studies.

Freshman Writing Seminars

The department offers freshman writing seminars on a variety of topics. Consult John S. Knight Writing Seminar Program brochures for times, instructors, and descriptions.

Classical Civilization

CLASS 100 Word Power: Greek and Latin Elements in the English Language

Fall. 3 credits. I. Hohenhall. This course gives the student with no knowledge of the Classical languages an understanding of how the Greek and Latin elements that make up over half our English vocabulary operate in both literary and scientific English usage. Attention is paid to how words acquire their meaning and to enlarging each student's working knowledge of vocabulary and grammar.

CLASS 102 Bioscientific Terminology

Summer. 3 credits. H. Roisman. A study of the Greek and Latin word elements that combine to form most of the specialized terms in the biological sciences. The student who learns the meanings of those elements and the rules of word formation usually can recognize the basic meaning of any unfamiliar word in that field. The class also gives attention to misformations and words still in use that reflect outdated scientific theories.

CLASS 211 The Greek Experience #

Fall. 3 credits. F. Ahl. An introduction to the literature and thought of ancient Greece. Topics will include epic and lyric poetry, tragedy and comedy, and historical, political, philosophical, and scientific writings. Satisfies the requirement for the depth component of the major in Greek.

CLASS 212 The Roman Experience #

Spring. 3 credits. Not offered 1995-96; next offered 1996-97. D. Mankin. An introduction to the civilization of the Romans as expressed in their literature, religion, and social and political institutions.

CLASS 217-218 Initiation to Greek and Roman Cultures #

Limited to 18 students. These courses are intended especially for freshmen (a few exceptionally motivated sophomores or upperclass students may be accepted) and may be taken independently of one another. Apply in writing to the chair, Department of Classics, 120 Goldwin Smith Hall. Knowledge of Greek or Latin is not necessary, since all texts are in translation. What is necessary is the willingness to participate in three one-hour seminars each week and also a supplementary one-hour (occasionally two-hour) session, during which the class will participate in workshops with specially invited guests.

CLASS 217 Initiation to Greek Culture: The Greeks at War, from Troy to Chaironeia #

Fall. 4 credits. M W F 10:10-11:00, plus one hour to be arranged. J. Coleman and guest lecturers. One of the most troubling legacies of the Ancient Greeks is their almost unquestioning acceptance of war as a legitimate human activity and a measure of male heroism. Our critical examination will show how literature and art exemplify this predominant Greek culture.
attitude, beginning with the first and greatest war poem, the Iliad, and concluding with the Macedonian conquests of the 4th century B.C.E. Included are Herodotus on the Persian wars, Thucydides on the Peloponnesian War, and the anti-war comedies of Aristophanes. Among themes to be considered are the literary and visual image of the hero, the role of women as mediators and victims, and the importance of warfare in the political life of the Greek city-states.

[CLASS 218] Initiation to Roman Culture #
Spring. 4 credits. Not offered spring 1996.

[CLASS 223] The Comic Theater (also Comparative Literature 223 and Theatre Arts 223) #
Spring and summer 1996. 3 credits. J. Rusted.
The origins of comic drama in ancient Greece and Rome, and its subsequent incarnations especially in the Italian renaissance (Commedia erudita and Commedia dell'arte), Elizabethan England, seventeenth-century France, the English Restoration, and Hollywood in the thirties and fourties. Chief topics will be: the growth of the comic theatrical tradition and conventions; techniques and themes of comic plots (trickster, parody, farce, caricature); and the role of comedy in society. All readings in English.

[CLASS 224] Hidden Songs in Greece and Asia (also Asian Studies 270 and Comparative Literature 224) #
Spring. 3 credits. G. Holst-Warhaft and D. McCann.
For description, see ASIAN 270.

[CLASS 236] Greek Mythology (also Comparative Literature 236) #
Fall 1995 and summer 1996. 3 credits. J. Mankin.
A survey of the Greek myths, with emphasis on the content and significance of the myths in Mediterranean society, including the place of myth in everyday life and consciousness; the factors and influences involved in the creation of myths; and the use of myths for our understanding of Greek literature, religion, and moral and political concepts.

[CLASS 237] Greek Religion and Mystery Cults (also Religious Studies 237) #
Greek religion constitutes one of the essential features of ancient Greek civilization and distinguishes it from later Western civilization. Since religion permeates Greek culture, including the major art forms (epic poetry, tragedy, comedy, architecture, painting, sculpture), the course will investigate the interaction of religion with these forms—an investigation that is fruitful both for the understanding of Greek religion and the forms themselves, some of which, like tragedy, originated in cult. A representative variety of cults and their history will be studied with special emphasis on cults, such as the Eleusinian mysteries of Demeter and Persephone, the Kabeiroi, the Great Gods of Samothrace, and Bacchic rites.

[CLASS 238] The Ancient Epic and Beyond #
We will move, Odyssey-like, to the West, beginning with Homer's Iliad (and including the British poet Christopher Logue's "account" of the opening books) and Odyssey, we will continue in the Hellenistic and Augustan eras with Apollonius of Rhodes' Argonautica and Virgil's Aeneid. A violent shift in space and time will have us conclude with two New World maritime epics: Herman Melville's Moby Dick and Derek Walcott's Omeros.

[CLASS 245] Greek and Roman Historians #

[CLASS 247] Byzantine History and Culture (also Religious Studies 245) #
Spring. 3 credits. G. Van Steen.
From 312 to 1453, the Byzantine Empire was a major force in the Eastern Mediterranean and played a decisive role in the history, politics, and culture of Western Europe. This course traces the political, social, literary, and religious development of the Byzantine state.

Spring. 3 credits. Staff.
An interdisciplinary course on how techniques of physical sciences and engineers and archaeologists are being applied to issues in cultural research. For complete description, see ENGRG 185.

[CLASS 291] Classical Indian Narrative (also Asian Studies 291) #
For description, see ASIAN 291.

[CLASS 333] Greek and Roman Mystery Cults and Early Christianity (also Religious Studies 333) #
A study of the controversial question of religious continuity between paganism and early Christianity. After a brief survey of Classical mystery cults and Hellenistic religion, the course will focus on such Hellenistic cults as the mystery cults of Isis, Bacchus, and Attis and the Great Mother and on the distinctive features that contributed to their success.

[CLASS 382] Greeks, Romans, and Victorians (also Comparative Literature 382)
Modern popular and scholarly views of Greek and Latin literature were shaped in the Victorian years of the nineteenth century, between the years of the Republican and Marxist revolution. This course explores some of the ways in which nineteenth-century social and intellectual upheavals, and changes in scholarly techniques and approaches, may have affected how English and Irish writers presented Greco-Roman antiquity and, especially, how they began to discard an idealized past based on a Roman model for one based on a Greek model. The focus will be on novelists and dramatists (and a few artists and novelists) rather than on philosophers and scientists. The varied influences of Vergil and Homer, Seneca and Sophocles, Pausanias and Aristophanes, Horace, and Greek lyric poetry will be discussed in selected works of writers such as Thomas More, Shelley, Byron, Swinburne, Arnold, Tennyson, W. S. Gilbert, Oscar Wilde, Samuel Butler, and others, including important artists such as Aubrey Beardsley.

[CLASS 390] Comparative Sanskrit Myth and Epic (also Asian Studies 390) #
Readings in translation from the two Sanskrit epic poems, the Mahabharata and the Ramayana, and from the main cycles of the Puranas, the Sanskrit mythological literature. Special attention will be given to parallels and comparisons with Greek myth and epic, especially Homer and Hesiod. Classics 236 or 238 would be useful background, but not presupposed.

[CLASS 395] Classical Indian Philosophical Systems (also Asian Studies 395 and Religious Studies 395) #
4 credits. Prerequisite: some background in philosophy or in classical Indian culture. Not offered 1995–96. C. Minkowski.
For description, see ASIAN 395.
Among the questions this course will address are: what role does gender have in Roman political life? The history of family, marriage, and sexuality becomes the subject of political debate and legislation. Why do issues such as family, marriage, and sexuality become subjects of political debate and legislation?

CLASS 459 The Language of Myth

Among the questions this course will address are: what role does gender have in Roman political discourse and ideology? Why do issues such as family, marriage, and sexuality become subjects of political debate and legislation?

CLASS 465-466 Independent Study in Classical Civilization, Undergraduate Level

An undergraduate seminar examining the relationship between gender and politics in ancient Rome might take place for women in Roman political life. What role does gender have in Roman political discourse and ideology? Why do issues such as family, marriage, and sexuality become subjects of political debate and legislation?

CLASS 468 Roman Society and Politics under the Julio-Claudians (also History 473)

An undergraduate seminar examining several of the important social and political changes in Roman society under Augustus and his successors, the Julio-Claudians. Topics to be investigated include Augustus's consolidation of power through political and social revolution, the Augustan attempt to regulate family life and social relations by legislation, the relation of the emperor Tiberius with the members of the old ruling class, the growth of the imperial bureaucracy and the new opportunities for social mobility, the political opposition to Claudius and Nero, Nero's cultural and provincial policy, and the manipulation of the imperial cult. All readings will be in English.

CLASS 711-712 Independent Study for Graduate Students in Classical Civilization

Fall, 4 credits. Spring, 4 credits. Up to 4 credits.

Greek

CLASS 101 Greek for Beginners

Fall. 4 credits. F. Ahl. Introduction to Attic Greek. Designed to enable the student to read the ancient authors as soon as possible.

CLASS 103 Attic Greek

Spring. 4 credits. Prerequisite: 101 or equivalent. H. Pelliccia. A continuation of Classics 101.

CLASS 104 Intensive Greek

Summer. 6 credits. Staff. An intensive introduction to the fundamentals of ancient Greek grammar. Prepares students in one term for 200-level Greek.

CLASS 111-112 Modern Greek

111, fall, 112, spring. 3 credits each term. H. Kollas.

CLASS 201 Attic Authors

Fall. 3 credits. Prerequisite: Classics 103 or 104 or equivalent. H. Pelliccia. Selected readings from Greek prose and poetry.


Spring. 3 credits. Prerequisite: at least one year of ancient Greek (Classics 101-103) or permission of instructor. L. Kant. Selections in Greek from all four gospels, the letters of Paul and Acts.

CLASS 206 Herodotus

Spring. 3 credits. Prerequisite: Classics 103 or 104 or equivalent. A. Ramage. Selected readings from Herodotus' Histories.

CLASS 209 Greek Composition

Spring. 3 credits. Prerequisite: One term of 200-level Greek or equivalent. Not offered 1995-96; next offered 1997-98.

CLASS 213 Intermediate Modern Greek

Fall. 3 credits. Prerequisite: Classics 112 or placement by departmental examination. H. Kollas. This course, designed for students who have completed introductory modern Greek or have a reading knowledge of the language, will give attention to developing facility in conversational and written expression, usually in connection with assigned readings reflecting Greek history and culture.

CLASS 214 Readings in Modern Greek Literature

Spring. 3 credits. Prerequisite: Classics 213 or permission of instructor. Not offered 1995-96. A study of modern Greek language, history, and culture as manifested in the works of individual poets, dramatists, and prose writers.

CLASS 310 Greek Undergraduate Seminar: Sophocles and Euripides

Fall. 4 credits. Prerequisite: two 200-level courses in Greek or permission of instructor. K. Clinton.

CLASS 311 Greek Philosophical Texts: (also Philosophy 411)

Fall and spring. Up to 4 credits. Prerequisites: Knowledge of Greek and permission of instructor. T. Irwin. Readings of Greek philosophical texts in the original.

CLASS 313 Greek Epic

Fall and spring. Up to 4 credits. Prerequisites: Classics 206 or equivalent. Not offered 1995-96. Readings from the Odyssey. Emphasis upon the nature of Homeric language and the literary interpretation of the poem.

CLASS 401-402 Independent Study in Greek, Undergraduate Level

401, fall; 402, spring. Up to 4 credits.

CLASS 417 Advanced Readings in Greek

Fall. 4 credits. Not offered 1995-96.

CLASS 419 Advanced Greek Composition

3 credits. Prerequisite: Classics 209 or equivalent. Not offered 1995-96; next offered 1996-97.

CLASS 433 Greek Mystery Cults (also Classics 633 and Religious Studies 433)

4 credits. Prerequisite: one term of 300-level Greek or permission of instructor. Not offered 1995-96; next offered 1997-98. K. Clinton. Discussion of the major Greek mystery cults—the Mysteries at Eleusis, the cult of the Great Gods at Samothrace, and Dionysiac mysteries—with the aim of elucidating the structure and religious purpose of these cults and the nature of the initiates' experience. The evidence includes: the Homeric Hymn to Demeter, Plato's Symposium, works of Christian Fathers, inscriptions, artistic representations, and archaeological data.

CLASS 457 Greek Sanctuaries and Pausanias (also Classics 357)

4 credits. Not offered 1995-96; next offered 1996-97. For description, see Classical Civilization, Classics 357. Students in Classics 457 will read relevant sections of Pausanias and other documentation such as inscriptions in Greek.

CLASS 501 Introduction to Greek Epigraphy

Fall. 3 credits. Prerequisite: one term of 300-level Greek. K. Clinton.

CLASS 633 Greek Mystery Cults (also Classics 433)


CLASS 671 Graduate Seminar in Greek: Aeschylus

Fall. 4 credits. K. Clinton.

CLASS 672 Graduate Seminar in Greek: Pindar

Spring. 4 credits. H. Pelliccia.

CLASS 701-702 Independent Study for Graduate Students in Greek

701, fall; 702, spring. Up to 4 credits.

Latin

CLASS 105 Latin for Beginners

Fall. 4 credits. Staff. An introductory course in the essentials of Latin, designed for rapid progress toward reading the principal Latin writers.

CLASS 106 Elementary Latin

Spring. 4 credits. Prerequisite: 105 or equivalent. Staff. A continuation of Classics 105, using readings from various authors.

CLASS 107 Intensive Latin

Spring and summer. 6 credits. Staff. Prepares students in one term for 200-level Latin.

CLASS 205 Intermediate Latin

Fall. Prerequisite: Classics 106, 107, or placement by departmental examination. Spring in Latin prose.

CLASS 207 Catullus

Spring and summer. 3 credits. Prerequisite: Classics 106, 107, or one term of 200-level Latin. D. Mankin.

CLASS 216 Vergil

Spring. 3 credits. Prerequisite: Classics 106, 107, or one term of 200-level Latin. Not offered 1995-96; next offered 1996-97.
CLASS 241 Latin Composition
Spring. 3 credits. Prerequisite: Classics 106, 107, or equivalent. Not offered 1995-96; next offered 1996-97.

CLASS 312 Latin Undergraduate Seminar: Sallust
Spring. 4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. P. Keyser.

CLASS 314 The Augustan Age
Fall. 4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. D. Mankin.

CLASS 317 Roman Historiography: Suetonius and Tacitus
Spring. 4 credits. Prerequisite: one term of 300-level Latin or permission of instructor. Not offered 1995-96.
J. Ginsburg.

CLASS 338 Latin Undergraduate Seminar
4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1995-96.

CLASS 411 Advanced Readings in Latin Literature: Prose
Fall. 4 credits. H. Pelliccia
Rapid reading of prose works selected from graduate reading list. Emphasis will be on translation skills. Designed to meet the needs of graduate students preparing for "A" exams, and especially for those intending to take Advanced Latin Prose Composition in the spring. Open to advanced undergraduates by permission of the instructor.

CLASS 412 Advanced Readings in Latin Literature: Apuleius

CLASS 439 Ammianus Marcellinus and the 4th Century A.D. (also Classics 639)
4 credits. Prerequisite: permission of instructor. Not offered 1995-96.
D. Shanzer.

CLASS 451-452 Independent Study in Latin, Undergraduate Level
451, fall; 452, spring. Up to 4 credits.

CLASS 468 Augustine's Confessions (also Religious Studies 468)
4 credits. Prerequisite: two terms of 200-level Latin or permission of instructor. Not offered 1995-96.

CLASS 603-604 Topics in Late Antique and Medieval Latin Literature

CLASS 639 Ammianus Marcellinus and the 4th Century A.D. (also Classics 439)
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1995-96.
D. Shanzer.

CLASS 679 Graduate Seminar in Latin
Fall. 4 credits. Not offered 1995-96; next offered 1996-97.

CLASS 680 Graduate Seminar in Latin: Historiography
Spring. 4 credits. J. Ginsburg.

CLASS 751-752 Independent Study for Graduate Students Latin
751, fall; 752, spring. Up to 4 credits.

CLASS 219 Mediterranean Archaeology (also Near Eastern Studies 267)
Fall. 3 credits. Not offered 1995-96; next offered 1996-97.
J. Coleman.

CLASS 220 Introduction to Art History: The Classical World (also History of Art 220)
Fall. 4 credits. A. Ramage.

CLASS 221 Minoan-Mycenaean Art and Archaeology (also Archaeology 221 and History of Art 221)
Spring. 3 credits. J. Coleman.
The birth of civilization in Greece and the Aegean islands during the Bronze Age. The main focus is on the rise and fall of Minoan Crete and Mycenaean Greece, with consideration given to the nature and significance of Aegean interactions with Egypt, the Near East, and Anatolia.

CLASS 232 Archaeology in Action I (also Archaeology 232 and History of Art 224)
Fall. 3 credits. Prerequisite: permission of instructor. Not offered fall 1995.
P. I. Kuniholm.

CLASS 233 Archaeology in Action II (also Archaeology 233 and History of Art 225)
Spring. 3 credits. Prerequisite: permission of instructor. Not offered spring 1996.
P. I. Kuniholm.

CLASS 249 Introduction to Jewish Art and Archaeology from the Hellenistic to the Rabbinic Period (also Archaeology 247, Near Eastern Studies 247, and Religious Studies 247)
For description, see JWST 247.

CLASS 309 Dendrochronology of the Aegean (also Archaeology 308)
Spring. 4 credits. Prerequisite: permission of instructor. Limited to 10 students.
P. I. Kuniholm.

CLASS 320 The Archaeology of Classical Greece (also History of Art 320)
A. Ramage.

CLASS 322 Greeks and Their Neighbors (also History of Art 328)
A. Ramage.

CLASS 323 Painting in the Greek and Roman World (also History of Art 323)
A. Ramage.

CLASS 326 Greek Cities and Towns (also History of Art 326)
A. Ramage.

CLASS 327 Greek and Roman Coins (also History of Art 327)
A. Ramage.

CLASS 329 Greek Sculpture (also History of Art 329)

CLASS 350 Arts of the Roman Empire (also History of Art 322)
Spring. 4 credits. A. Ramage.
For description, see ART H 322.

CLASS 360 Field Archaeology in Greece (also Archaeology 360)
Summer. 6 credits. Not offered 1996; next offered summer 1997.
A six-week archaeological field training program in conjunction with the Cornell Halai and East Lokris Project. For information and application forms, contact Professor John E. Coleman, Department of Classics, 120 Goldwin Smith Hall.
ARTS AND SCIENCES - 1995-1996

CLASS 423 Ceramics (also Archaeology 423 and History of Art 423) #
Spring. 4 credits. Prerequisite: permission of instructor. J. Cole. Bronze Age, Greek and Roman pottery specimens from Near Eastern and Mediterranean sites will be studied to provide direct experience in one of the basic prerequisites of archaeological of archaeological excavation—the identification and dating of pottery types. Reports, delivered in class, will concern ancient ceramic materials or particular types. Practical experience in making and decorating pottery will be encouraged.

CLASS 432 Sards and the Cities of Asia Minor (also Archaeology 432 and History of Art 432) #
4 credits. Prerequisite: permission of instructor. Not offered 1995-96. A. Ramadan.

CLASS 434 The Rise of Classical Greece (also Archaeology 434 and History of Art 434) #
Spring. 4 credits. Recommended: Classics 220 or 221, History of Art 220 or 221, or permission of instructor. Not offered 1995-96. P. L. Kuniholm.

CLASS 435 Seminar on Roman Art and Archaeology (also History of Art 427) #
4 credits. Prerequisite: permission of instructor. Not offered 1995-96. A. Ramadan.

CLASS 475-476 Independent Study in Classical Archaeology, Undergraduate Level
475, fall; 476, spring. Up to 4 credits.

CLASS 629 The Prehistoric Aegean and Cyprus (also Archaeology 629) #
4 credits. For graduate students, and advanced undergraduates with permission of instructor. Not offered 1995-96. J. Cole.

CLASS 630 Selected Topics in Classical Archaeology (also Archaeology 520 and History of Art 520)
Spring. 4 credits. Not offered 1995-96. For description, see ART H 520.

CLASS 721-722 Independent Study for Graduate Students in Classical Archaeology
721, fall; 722, spring. Up to 4 credits.

Greek and Latin Linguistics

CLASS 421 Greek Comparative Grammar (also Linguistics 609) #
4 credits. Prerequisite: thorough familiarity with the morphology of classical Greek. Not offered 1995-96; next offered 1997-98. A. Nussbaum. The prehistory and evolution of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.

CLASS 422 Latin Comparative Grammar (also Linguistics 610) #
4 credits. Prerequisite: thorough familiarity with the morphology of classical Latin. Not offered 1995-96; next offered 1997-98. A. Nussbaum. The prehistory and evolution of the sounds and forms of Classical Latin as reconstructed by comparison with the other Indo-European languages.

CLASS 424 Italic Dialects (also Linguistics 612) #

CLASS 425 Greek Dialects (also Linguistics 614) #

CLASS 426 Archaic Latin (also Linguistics 615) #

CLASS 472 Honors Course: Senior Essay
Spring. 4 credits. For students who have successfully completed Classics 471. Topics must be approved by the student's honors committee at the end of the first term of the senior year.

Related Courses in Other Departments and Programs
See listings under: Archaeology Comparative Literature English History History of Art Medieval Studies Modern Languages and Linguistics Near Eastern Studies Philosophy Religious Studies Society for the Humanities Women's Studies

COMPARATIVE LITERATURE


The Department of Comparative Literature provides a broad range of courses in European as well as non-European literatures. Courses variously stress significant authors, themes, problems, styles, genres, historical periods, and theoretical perspectives. The departmental offerings reflect current interdisciplinary approaches to literary study, hermeneutics, rhetorical analysis, semiotics, deconstruction, Marxism, reception aesthetics, feminism, formalism, and psychoanalysis.

The Major
The major enables students to develop an integrated knowledge of Western literature, to strengthen their reading and writing abilities, and to prepare for careers demanding analytical, interpretive, and evaluative skills. Prospective majors should consult with the director of undergraduate studies. After declaring a major, a student chooses an adviser from the department's faculty. The requirements for the major are designed to allow each student to follow a course of study that combines intellectual rigor with the pursuit of personal interests. The specific
contours of such a program are worked out in consultation with the student’s adviser.

Requirements for the Major

1) Five courses in Comparative Literature at the 200 level and above, including the core course listed below. A student may include up to two literature courses from other departments.

2) One core course in Comparative Literature (for 1995-96 the core course is Comparative Literature 413 [fall]), to be taken by all majors either in the spring term of their junior year or the fall term of their senior year. Students may enroll in both core courses.

3) Five courses in literature or other areas of the humanities at the 200 or higher level, to be taken in one or more foreign literature departments. Texts must be read in the original language. A student may offer four of the above course (conversation, composition, etc.).

4) A senior essay (Comparative Literature 493) of roughly fifty pages, to be written during the senior year under the direction of the student’s adviser.

The department also encourages:

1) a program that includes broad historical coverage (e.g., Comparative Literature 201-202: Great Books, Comparative Literature 210: Ancients and Moderns); intensive study of a single genre, (e.g., Comparative Literature 320: Introduction to Caribbean Poetry, Comparative Literature 363-364: The European Novel); Comparative Literature 365: Contemporary Fiction, analysis of problems in literary theory (e.g., Comparative Literature 302: Literature and Theory, Comparative Literature 381: Marxist Cultural Theory, and Comparative Literature 402: Theories of Rhetoric)

2) a second foreign language, especially for students interested in graduate work in literature.

Honors

A student who completes the requirements for the major is eligible for the degree of Bachelor of Arts with honors in comparative literature. The department bases its decision on the student’s achieving grades of at least B+ in the senior essay and in course work for the major, and on overall academic performance at Cornell.

Freshman Writing Seminars

Most 100-level courses may be used toward satisfying the freshman writing seminar requirements. See “John S. Knight Writing Program” for a full description of the freshman writing seminar program.

Courses

Note: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

[COM L 150] Introduction to Cultural Studies (also Society for the Humanities 150) 
4 credits. Does not satisfy the freshman writing seminar requirement, but will satisfy the distribution requirement. Not offered 1995-96.

[COM L 201-202] Great Books 
201, fall; 202, spring. 4 credits. Comparative Literature 201 and 202 may be taken independently of each other. COM L 202 also offered summer 1995.
A reading each semester of seminal texts that represent and have shaped Western culture and hence form an essential part of the student’s intellectual education. By analyzing, interpreting, and evaluating, students will develop critical reading abilities. 201: selections from the Bible, Homer, Dante, Rabelais, Shakespeare, and others.

202: World literature of the last 300 years, emphasizing the response to European worldwide expansion first in the colonizing countries, then in the colonized. A central concern will be the globalization of European literary forms. Probable authors: Camoens, Shakespeare, Behn, Voltaire, Melville, Conrad, Tagore, Lu Hsun, Borges, Cesaire, Mahfouz, Soyinka, Erniki, Erdrich, and selected lyric poets.

[COM L 205] Comparative American Literature 
Twentieth-century writing from Canada, the United States, Latin America, and the Caribbean. A hemispheric perspective will encourage thinking about and across cultural, linguistic, and national demarcations. This course takes its heading from a question asked by the poet William Carlos Williams, and a sort of reply, from Africa, passed on by the novelist Paul Marshall. “History, history! What do we fools know or care?” Besides these words, we will place those appearing as the epigraph of Paul Marshall’s The Chosen Place, The Timeless People. “Once a great wrong has been done, it never dies. People speak the words of peace, but their hearts do not forgive. Generations perform ceremonies of reconciliation but there is no end.” Countering the literature of amnesia and baseless optimism, the works that we will read cannot forget, and decline to forgive, the historical traumas that so bitterly flavor them. Our concern largely will be with understanding the aesthetic means and strategies that certain writers use to perform ceremonies not bent on reconciliation. Readings will include Wilson Harris, “Adversarial Contexts and Creativity”, Joy Rogawa, Obaasan; Sheila Watson, The Double Hook; Michael Orisadare, In the Skin of a Lion; Hubert Aquin, The Antipodeon; Jean Toomer, Cane; William Faulkner, Absalom, Absalom!; Djuna Barnes, Nightwood; Mariano Azuela, The Underdogs; Gabriel García Márquez, One Hundred Years of Solitude; José Donoso, Cuchif; and Eduardo Galeano, The Book of Embraces.

[COM L 210] Ancients and Moderns 
4 credits. Not offered 1995-96.)

[COM L 213] Existentialism and Literature (also Philosophy 213) 
Fall. 4 credits. A. Wood.
For description, please see Philosophy 213.

[COM L 223] The Comic Theater (also Classics 223 and Theatre Arts 223) 
Spring. 3 credits. (also offered summer ’96). J. Rusten.
For description, please see Classics 223.

[COM L 224] Hidden Songs in Greece and Asia (also Asian Studies 270 and Classics 224) 
Spring. 3 credits. To be announced. G. Holst-Warhaft and D. Mcclough.
For description, please see ASIAN 270.

[COM L 234] Arabs and Jews in Confluence and Conflict (also NES 234, JWST 234, Rel. St. 234) 
Fall. 3 credits. T R 8:40-9:55. R. Brann.
For description, please see NES 234.

[COM L 236] Greek Mythology (also Classics 236) 
Fall. 3 credits. Limited to 200. (also offered summer ’96)
For description, see Classics 236.

[COM L 243] Poetry and Politics in the Americas (also English 243) 
Spring. 3 credits. M. W. F. B. V. Olguin.
This course examines poetry and poetics as dialogical statements where history, politics, and culture are actively engaged by the poet and the poem. Our particular focus will be on poetic interventions in popular struggles throughout the Americas over time—from nineteenth-century independence movements to twentieth-century nationalist and internationalist struggles—and across space—from the Caribbean, South, Central, and North America. Students will consider the unique challenges to aesthetics, ideology and identity in general posed by various engaged artists such as José Martí, Nicanor Parra, Ariel Dorfman, Pablo Neruda, Nicholas Guillén, Cláirbél Alegria, Roque Dalton, Raúl Salinas, Lorna Dee Cervantes, Carolyn Forché, Alejandro Murguía, and G. Sánchez, Allen Ginsberg, Minn Espada, Gwendolyn Brooks, Adrienne Rich and others.

[COM L 302] Literature and Theory (also Comparative Literature 602) 

[COM L 304] Colonialism and Narrative 

[COM L 313] Japanese and Asian Film (also Asian Studies 313, Theatre Arts 313) 
Spring. 4 credits. B. deBary.
For description, please see Asian Studies 313.

[COM L 320] Introduction to Caribbean Poetry 

[COM L 326] Christianity and Judaism (also Religious Studies 326) 
Spring. 4 credits. Not open to freshmen.
To be arranged. C. Carmichael.

[COM L 328] Literature of the Old Testament (also Religious Studies 328) 
Fall. 4 credits. Not open to freshmen.
Analysis of selected material in translation.

[COM L 333] Neo-Classical Theater (also THETR 333) 
Spring. 4 credits. Prerequisite: THETR 240 or THETR 241. T R 1:25-2:40.
J. Devenyi.
For description, see THETR 333.

COMPARATIVE LITERATURE 361
COM L 334 Muslims, Christians and Jews in Islamic Spain: Literature and Society (also COM L 639, Near Eastern Studies 339/668, Jewish Studies 334, Islamic Studies 334 and Spanish Literature 339) #
Spring. 4 credits. S/U or letter option. Enrollment limited to 20 students. Grad course for letter grade only. R. Brann.
For description, please see Near Eastern Studies 339/639.

COM L 337 The Modern and Contemporary Theatre (also THETR 335)
Spring. 4 credits. Prerequisite: THETR 240 or permission of instructor. J. E. Gianin.
For description, see THETR 335.

COM L 339 Ancient Wit: An introduction to the Theory and Form of Comic and Satiric Writing in Greece and Rome (also Classics 339) #
Spring. 4 credits. F. Aih.
For description, please see Classics 339.

COM L 340 Twentieth-Century European Intellectual History (also History 354)
Fall. 4 credits. T R 2:55-4:10. D. LaCapra.
For description, please see History 354.

COM L 343 Contemporary Mass Culture in Japan and in the U.S. (also Asian Studies 363)
Fall. 3-4 credits. T R 10:10-11:25. B. delRay.
For description, please see Asian Studies 363.

COM L 345 Letter, Novel, Dictionary: The Making of National Language (also NES 343 and JWST 345) #
Fall. 4 credits. Enrollment limited to 25 students. For letter grade only. T R 1:25-2:40 I. Tucker.
This course will trace the emergence of the concept of national language in Europe in the eighteenth and nineteenth centuries, attempting to discover what exactly was at stake in the establishment of language as the paradigmatic form of national culture. Using the "case" of the Hebrew language as the organizing principle of the first part of the course, we will examine a variety of theories of linguistic and political authority. We will then turn to the novel as a genre centrally concerned with the paradoxical construction of "written speech," tracing the movement from the epistolary novel's formal attempt to make written language behave like speech, to the development of narrative voice as a kind of standardization of speech, to the decline of the univocal national novel. In this light, the course will return to the theoretically and historically rich readings of Hebrew, focusing in particular on the late-nineteenth-century rise of the Hebrew novel, texts composed in a language without a vernacular out of fragments of existing religious writings. We will also examine the epistemological, pedagogical, sociological and formal presumptions underwriting a variety of efforts to institutionalize national language, including the Académie Française and national dictionaries like that of Samuel Johnson's and the OED. (All readings will be in English.)

COM L 350 Education and the Philosophical Fantasies (also Russian Literature 350)
For description, please see RUSSL 350.

COM L 359 Being, God, Mind: Key Terms of Western Thought from Plato to Vico (also Romance Studies 459) #
Fall. 4 credits. T R 10:10-11:25. C. M. Arry.
Systematic course in European intellectual history, with a triple focus: a) the codification of ethical concepts in Plato and Aristotle (love, finality, choice, virtue, wisdom, art, happiness). New meanings in medieval scholasticism as a synthesis of Bible and Greek thought. First modern variants (Descartes, Vico); b) humanistic revolutions: continuity and the emergence of new paradigms in intellectual history; c) liberal vs. mechanico-scientific" criteria of social distinctions and discrimination.

[COM L 361 The Culture of the Renaissance I (also History 361 and Art History 350) #
4 credits. Not offered 1995-96. Semester next offered to be announced.]

[COM L 362 The Culture of the Renaissance II (also English 325 and History 350) #
4 credits. Not offered 1995-96. Semester next offered to be announced.]

COM L 363-364 The European Novel (363/364)
363, fall; 364, spring. 4 credits. Comparative Literature 363 and 364 may be taken independently of each other. Note: normal semester order is reversed for 1995-96 only.
363: This course will survey the history of the novel until the mid-nineteenth century, focusing on the social, literary, and philosophical significance of its narrative forms. Topics to be discussed: the novel as a site of conflict between "high" and "low" culture; the relation of fictional narrative to historical and autobiographical narrative; the gender politics and class ideology of romance. Texts may include Lazarillo de Tormes or Cervantes' Don Quixote, Fielding's Tom Jones, Laclau's Dangerous Liaisons, Goethe's The Sorrows of Young Werther, Bronte's Wuthering Heights.
364: Flaubert's Madame Bovary, Dostoevsky's Crime and Punishment, Turgenev's Fathers and Sons, Gadda's The Great Hare, Joyce's Portrait of the Artist as a Young Man, Kafka's stories, Malraux's Man's Fate. Close attention will be paid to the texts of the novels considered as creations of literary art as well as documents of the achievements of the human mind in a fascinating period of change in European history. We shall briefly examine the historical and cultural background of novels written in France, Russia, England, Ireland, and Central Europe, and the artistic and psychological assumptions discernible in them as well as historical perceptions of Romanticism, Realism, and Modernism. No knowledge of foreign languages required. Mixure of lectures and class discussion.

COM L 365 Contemporary Fiction (also French Literature 365) #
A continuation of Comparative Literature 363-364 (The European Novel). Probable authors: Barthes, Boll, Calvino, Camus, Cardinal, Garcia Márquez, Hemingway, Kundera, Robbe-Grillet, Sartre. An attempt to interpret these authors through questions like those raised by Roland Barthes on writing, structuralism, criticism, the rule of the reader, the death of the author, etc. Lectures and seminar discussions.

COM L 367 The Russian Novel (also Russian Literature 367) #
For description, please see RUSSL 367.

COM L 372 Selections from Contemporary World Literature
Readings of celebrated texts by contemporary authors, with attention to the local and global contexts of their literary production and reception. The course includes works in various genres by such authors as Christa Wolf, Marguerite Duras, Gabriel García Márquez, Chinua Achebe, Vaclav Havel, Nadine Gordimer and Toni Morrison.

COM L 382 Greeks, Romans, and Victorians (also Classics 382) #
Spring. 4 credits. To be arranged. F. Aih.
For description, please see CLASS 382.

COM L 386 Problems in Modernism: Primitivism (also Art History 366)
Fall. 4 credits. T R 1:25-2:40. H. Foster.
For description, please see ART H 366.

COM L 396 German Film (also German Studies 396 and Theatre Arts 396)
Spring. 4 credits. Lecture participation in class discussion, one paper, midterm, and final. D. Bathrick.
For description, please see GERST 396.

COM L 401 Alchemy and Abjection in Early Modern Europe (also Society for the Humanities 420 and Romance Studies 406)
Spring. 4 credits. Enrollment limited to 17 students. R 2:30-4:25. K. P. Long.
Using the psychoanalytic works of Jung (The Psychology of Alchemy) and The Powers of Horror of Kristeva as guides, this course will focus on the development of a divided subject in early modern alchemical treatises such as Concerning the Nature of Things of Paracelsus, the Aureum vitæls (The Golden Fleece) of Salomon Trismogen, the Atlantes (Flying Atlanta) of Michael Maier, The Chimical Wedding of Christian Rosencreutz, among others. This course will provide an introduction to hermetic (alchemical) thought and explore the problem of gender distinction and its relationship to the gnostic divisions of spiritual/material, active/pasive, and mind/body. We shall explore how these dualisms are played out and played with in the alchemical texts and how they carry over into modern notions of subjectivity, based as they are on the subject/object distinction, which privileges the subject as agent. We shall also see how the alchemical emblem books in particular problematize these dualisms by "marrying" visual elements to their texts, in an attempt to embody abstract concepts. These works (both) are playing with the idea of a reciprocal nature of these terms, and between subject and object as well. They persist as a subversive undercurrent in early modern culture, offering an alternative to the institutionalized divisions between gender and class. All texts will be in English translation.

[COM L 404 History into Fiction: Nazis and the Literary Imagination (also German Studies 404)]
Next offered 1996-97.
For description, see ENGL 404.]
COM L 407  The Construction and Critique of the Enlightenment Subject (also Society for the Humanities 407)  
Spring. 3 credits. Enrollment limited to 17 students. W 2:30-4:25. H. Mah.
This seminar examines the construction and criticism of Enlightenment subjectivity in both the eighteenth century and recent social theory and philosophy. We first consider how Enlightenment writers sought to fashion a self defined by a transparent and socially unassailable rationality and then examine how that identity proved to be problematical for both Enlightenment writers and more recent theorists. Readings include Enlightenment texts, secondary historical literature, and critical analyses by Horkheimer and Adorno, Althusser, Lacan, Derrida, Foucault, and Habermas.

COM L 409  Disillusion and Disappearance (also Society of Humanities 409)  
Fall. 3 credits. Enrollment limited to 17 students. R 2:30-4:25. L. Quinne.
This course will examine the representation of frustrated ideals, balked hopes, and bitter disenchantment. It will explore the ways in which various kinds of literature represent disillusion with ideals in love, work, and self-descriptions. Considering especially how the experience of disillusionment is evaluated—whether as an impetus to psychological growth and intellectual development, or as a source of paralysis and despair. Both literary descriptions and analytical studies of disillusionment will be covered, as well as efforts to critique or repudiate the power of disillusion. Readings may include: poems by Blake, Shelley, Ashbery, and Bishop, Johnson, Rasselas, Faulkner, Sentimental Education, Proust, Swann in Love; Fitzgerald, Tender is the Night; McCarthy, Birds of America; essays by Emerson, Kierkegaard, and Nietzsche; psychoanalytic literature of melancholia (Freud, Abraham, Klein, Kristeva).

COM L 413  Death, Culture and the Language of the Deity  
Fall. 4 credits. Enrollment limited to 17 students. Core course for majors. T R 1:25-2:40. N. Melas.
Critical study of the old association between literary genericity, with emphasis on the frictions resulting from death's encounter in literature with other, more worldly notations, particularly those surrounding gender difference and colonial domination. Framed by Homer's Iliad and Derek Walcott's postcolonial epic Omeros, readings may include works by Hegel, Blanchot, Patterson, Duras, Condé, de Man, Conrad, Salih, Benjamin, Cixous.

COM L 418  Freedom and Interpellation  
Consideration of the nature of the discursively constructed subject and the freedom of movement as well as the limits implied in such a notion. Discussion of the agency or freedom of such a subject in relation to political theory, philosophy, literary traditions of romanticism and modernism, and contemporary critical debates concerning the mobility of the subject. Authors to be read include Locke, Kant, Mill, Rousseau, Kleist, Harriet Jacobs, Attwood, Lacan, Zizek, Laclau, Mouffe and Butler.

COM L 419-420  Independent Study  
419, fall; 420, spring. Variable credit. Comparative Literature 419 and 420 may be taken independently of each other.

COM L 422  African Literature (also ASIAN 422)  
Spring. 4 credits. M 2:00-4:25. A. Adams.
With such great focus, both inside and outside Africa, on issues of Africa's development, what place does "literature" take? Is African literature influencing or influenced by the mundane realities of daily living faced by African people? Or does African literature concern itself with philosophical ideas and ideals that transcend those realities to embrace the general human condition? Or, does it do both? The texts that we will be reading in this course will be approached in terms of these issues of "African development" and "the universal human experience."

COM L 425  Marx, Nietzsche, Freud (also German Studies 415, Government 473)  
Fall. 3 credits. T R 2:55-4:10. G. Waite.
For description, please see German Studies 415.

COM L 427  Russian Formalism (also Comparative Literature 627 and Russian Literature 427/827)  
For description, please see Russian Literature 427.

Fall. 4 credits. Limited to 40 students. M W F 1:25-2:15. J. Bishop.
Close readings of representative texts from the New Testament in modern scholarly editions, with the help of appropriate commentary, introductory and specialized. The focus for 1995 will be on Mark, Matthew, and Luke. All readings will be in English, but repeated reference to the Greek original will be made. Graduate students and undergraduates from other colleges who are interested in the material should not feel inhibited from enrolling. The approach will be primarily exegetical; that is, we will try to find out what the texts say and what they mean by what they say. Thus we can hope to stay open to scholarly and religious issues alike.

COM L 434  Ethics, Evil, Sexuality  
Fall. 3 credits. Limited to 17 students. R 2:30-4:25. J. Copjec.
The symbolic mutation that began in the nineteenth century to topple old regimes of power brought with it a mutation of the ethical field. The Good, which had formerly guided ethical action, dropped from our democratic consciousness. Many theorists have been cowed by this state of affairs into adopting a relativist stance on ethical questions. We will try to show why this position is not only insufficient, but unethical, how it remains blind to the real issue of evil whose insinuating rise over the last two centuries has been evidenced by modern racism. Focusing on a reading of Jacques Lacan's The Ethics of Psychoanalysis supplemented by philosophical and political texts (by Kant, Lefort, Laclau, Zizek, and others), we will attempt to show not simply what psychoanalysis might add to ethical thought, but why modern ethics is unthinkable outside psychoanalysis. We will also try to determine why Lacan makes a woman, Antigone, the exemplar of ethical action and to suggest what might constitute an ethical feminism. Several films, screened outside seminar hours, will serve as reference points for some of our discussions.

COM L 436  Theories of Contemporary Performance (also Theatre Arts 435)  
For description, please see THEAT 435.

COM L 438  Fictions of Change: Shakespeare, Scott, Stendhal, Achebe (also English 428)  
Fall. 4 credits. Enrollment limited to 20 students. M W F 11:15-12:05. H. Shaw.
What does change mean to Shakespeare, Scott, Stendhal, Achebe, and to their cultures? This course examines literature that represents periods of historical transition in England, Scotland, France, and Nigeria. What do these works reveal about the historical movements of culture and art in historical periods? How does the recognition that we are historical beings alter our sense of the human situation and of moral responsibility? We will focus our energy primarily on reading and discussing individual novels and plays. As time allows and class interest suggests, we will turn our attention to the source materials the various authors drew upon to and through which art and culture exist. Nonmajors are welcome.

COM L 450  Renaissance Poetry (also Comparative Literature 650)  
Spring. 4 credits. To be arranged. W. J. Kennedy.

COM L 454  The Herodotean Moment: The Uses and Abuses of Western Civilization (also Government 454)  
For description, please see GOVT 454.

COM L 455  Caribbean Literature (also African Studies 455)  
Fall. 4 credits. M 2:00-4:25. A. Adams.
This course will examine the prose literature of the Caribbean islands. Through the readings of several novels and short stories from the various languages and cultural strains that comprise the Caribbean societies, students will study the points of commonality and the diversity within this body of literature. The recurrence of certain historical, social, and cultural issues that have formed the multi-ethnic Caribbean peoples will be analyzed in their various manifestations across the linguistic and other boundaries to uncover the underlying shared experience.

COM L 470  Japanese Noh and Modern Dramatic Theory  
For description, please see ASIAN 470.
**COM L 493 Senior Essay**

Fall and spring. 8 credits.

Hours to be arranged individually in consultation with the Director of Undergraduate Studies. Approximately fifty pages to be written over the course of two semesters in the student’s senior year under the direction of the student’s adviser. An “A” grade in these histories seem so consistently to trace a discursive history of Jewishness as well. The second part of the course, “Forming the Group,” combines an examination of novelistic challenges to liberalism with an exploration of a variety of nineteenth-century efforts to formalize group identity: Marxism, nationalism, social science. In part III, we will examine the move to formalize group identity in the context of the Holocaust, asking what it would mean to see the historical event of genocide in relation to (and perhaps caused by) a history of form. We will end by looking at a number of post-structuralist explorations of these issues.

**COM L 609 Comparison and Cultural Difference**

Fall. 4 credits. T 10:10-12:05. N. Melas.

This course will be a wide-ranging investigation of comparison as a foundation for disciplines (e.g., comparative literature), a measurement of value, a means of understanding, and an act. Can comparison make links between things or cultures without subordinating differences to a common standard? What are the literary and cultural grounds of comparability? Roving from theories of metaphor and metonymy to magic, assimilation, and various forms of colonial doubling, we will seek answers and refine questions that might help us discern what exactly the limitations on comparing apples and oranges are. Authors may include: Aristotle, Ricoeur, Derrida, Foucault, Fanon, Genette, Frazer, Bhabha, Nancy, Glissant, Clifford, Homer.

**COM L 612 Allegory and Vernacular Poetry (also English 610)**

Spring. 4 credits. To be arranged. W. Wetherbee.

For description, please see ENGL 610.

**COM L 619-620 Independent Study**

619, fall; 620, spring. Variable credit. Comparative Literature 619 and 620 may be taken independently of each other.

**COM L 625 Art History and Visual Culture (also Art History 595)**

Fall. 4 credits. Prerequisite: permission of instructor is needed. W 2:30-4:25. H. Foster.

For description, please see ART 595.

**COM L 627 Russian Formalism (also Comparative Literature 427 and Russian Literature 427/627)**

Spring. 4-5-35. N. Poljak.

For description, please see COM L 427. Students who enroll in 627 will be required to do more and extra reading in translation and/or the original, and a longer, more substantial final paper, which will require more research.

**COM L 629 Cultural Studies (also English 608)**


A look at the intellectual, institutional, and political prospects of cultural studies. Can cultural studies become a master category for reconceptualizing the humanities and social sciences? The first half of the course surveys the field of cultural studies in England and the United States, with sidelong glances at France and Germany. The second half considers a territorial division within cultural studies—between postmodernism and postcolonial studies. Readings from Jean Baudrillard, Homi Bhabha, Stuart Hall, Fredric Jameson, Ernesto Ladlau and Chantal Mouffe, Francois Lyotard, Edward Said, Gayatri Spivak, Cornel West, and Raymond Williams, among others.


Spring. 4 credits. Open to qualified undergrads with permission of instructor. W 2-30-4:25. R. Bronan.

For description, please see NES 639.

**COM L 640 Paul Celan and the Shoah (also German Studies 640)**

Spring. 4 credits. Open to qualified undergrads with permission of instructor. Texts are in German. L. M. Obschern. For description, please see German Studies 660.

**COM L 650 Renaissance Poetry (also Comparative Literature 450)**


For description, please see COM L 450.

**COM L 660 Visual Ideology (also German Studies 660 and Theatre Arts 660)**

Spring. 4 credits. To be arranged. G. Waite.

For description, please see GERST 660.

**COM L 672 Theories of Modernism (also Art History 570)**

Spring. 4 credits. To be arranged. H. Foster.

For description, please see ART 570.

**COM L 691 Borderwork (also Spanish Literature 692)**

Spring. 4 credits. W 2:30-4:25. D. Castillo.

This course looks at literary works that thematize geographical, cultural, and linguistic borders between a Spanish-speaking and a non-Hispanic culture. Emphasis in the class will be on works written from the Spanish side of the divide. Writers like Pene Marques, Ana Lyda Vega, Jose Emilio Pacheco, and Mario Vargas Llosa may be included. We will, however, also look at books written in English, and may include works by writers such as Ruth Behar, Esmeralda Santiago, D. H. Lawrence, or Jose Antonio Burciaga who reflect upon a border experience from different racial, geographical, social class, and linguistic backgrounds.

**COMPUTER SCIENCE**


The Department of Computer Science is affiliated with both the College of Arts and Sciences and the College of Engineering. Students in either college may major in computer science. The following describes the College of Arts and Sciences major.

**The Major**

The major has three components: a core (a minimum of 42 credits), a group of electives in computer science and related fields (a minimum of 10 credits), and a concentration outside computer science (a minimum of 14 credits). The core focuses on the central topics within computer science: the logical design of programs, data structures, and algorithms. The remaining components of the major—the related electives and the outside concentration—provide a flexible extension to the core program. In consultation with their advisers, students are expected to choose electives and an outside concentration that best suit their graduate and career plans.

Students interested in pursuing an advanced degree in theoretical computer science should concentrate in mathematics. Students preparing for advanced work in scientific computation should take Computer Science 621 (instead of Computer Science 222) and Computer Science 622 (as a related elective) and concentrate in some branch of applied mathematics. Qualified students are encouraged to concurrently major in mathematics.

**Admission**

The prerequisites for admission to the major are:

1) Completion of Computer Science 100–211 (or 212)–280 (or equivalent)

2) Completion of Mathematics 111–122–221 or Mathematics 191–192–293

3) A 2.75 grade-point average in all computer science and mathematics courses

4) Acceptance by the department’s admission committee

After admission, students are expected to maintain at least a 2.75 grade-point average in their major courses. Any grade below C- in a
core course or related elective is not acceptable.

Core
The core consists of the following courses:
1) Calculus and linear algebra: Mathematics 111–122–221–222 or 191–192–293–294
2) Programming and systems: Computer Science 100, 211 (or 212), 314, 410 and 414
3) Theory of computation: Computer Science 280, 381 (or 381), and 482. (One of the following may be substituted for Computer Science 280. Mathematics 332, 432, 434, or 481.)
4) Numerical analysis: Computer Science 222 or 421

Related Electives
The related electives requirement consists of three courses. One must be a computer science course or course/laboratory combination numbered above 400 that includes a substantial programming project, for example, Computer Science 412/413, 414/415, 417/418, 432/433, 462/463, or 472/473; the other two are to be selected from the following:
- Electrical engineering courses numbered 301 or higher
- Operations research courses numbered 260 or higher
- Mathematics courses numbered 300 or higher (except 403, 405, 408)
- Computer Science courses numbered 400 or above, which are three credits or more (except CS 410).

Students are expected to select related electives that complement their concentration.

Concentration
This component encourages the student to study some discipline outside of computer science in reasonable depth. The concentration consists of an approved sequence of four courses (at least 14 credits) numbered 200 or higher in some field related to the theoretical or practical aspects of computing. A list of sample concentrations is included in the Computer Science Undergraduate Handbook. Students may also design their own concentrations, subject to the approval of their adviser.

Other Requirements
Computer science majors must also satisfy the College of Arts and Sciences and university requirements. In particular, the spirit of the 15-credit electives requirement will be strictly followed. This requirement helps ensure breadth of education, and consequently no computer- or mathematics-related course can be used toward its fulfillment. In general, no courses may be used to fulfill more than one requirement. There are two exceptions: first, appropriate core courses may be used to satisfy the group IV distribution requirement, and second, in the case of a double major, the same course may be applied to both majors.

Probability and statistics courses. Computer science majors are encouraged to include at least one course in the field of probability and statistics in their program of study. Although there is no formal department of statistics at Cornell, the Department of Mathematics and the School of Operations Research and Industrial Engineering offer various probability and statistics courses suitable for computer science majors, including:
- Math 471, Basic Probability
- Math 472, Statistics
- OR&IE 270, Basic Engineering Probability and Statistics
- OR&IE 360, Engineering Probability and Statistics II

Honors. A student may be granted honors in computer science on the recommendation of the Computer Science Undergraduate Committee. The committee guidelines will generally be the following:
1) An overall grade-point average of not less than 3.50
2) A grade-point average for all computer science courses of not less than 3.5
3) Satisfactory completion of at least two computer science courses numbered above 600 or satisfactory completion of a significant special investigation (Computer Science 490).

Courses
For complete course descriptions, see the computer science listing in the College of Engineering section.

COM S 099 Fundamental Programming Concepts
Fall. 2 credits. S-U grades only. No prerequisites.

COM S 100 Introduction to Computer Programming
Fall, spring, or summer. 4 credits. Students who plan to take both COM S 101 and 100 must take 101 first. During most semesters, two versions of COM S 100 (COM S 100a and COM S 100b) are available as described in the computer science listing in the College of Engineering.

COM S 101 The Computer Age (also ENGR E 101)
Summer. 3 credits. Credit is granted for both Computer Science 100 and 101 only if 101 is taken first.

COM S 211 Computers and Programming (also ENGR D 211)
Fall, spring, or summer. 3 credits. Prerequisite: Computer Science 100 or equivalent programming experience. Credit will not be granted for both Computer Science 211 and Computer Science 212.

COM S 212 Structure and Interpretation of Computer Programs
Fall, spring. 4 credits. Prerequisite: Computer Science 100 or equivalent programming experience. Credit will not be granted for both Computer Science 211 and Computer Science 212.

COM S 214 A Taste of UNIX and C
Fall, spring. 1–2 credits. Prerequisite: Computer Science 211, or equivalent programming experience. S-U grades only. Will not be offered after 1995–96.

COM S 222 Introduction to Scientific Computation (also ENGR D 222)
Spring. 3 credits. Prerequisites: Computer Science 100 and pre/corequisite of Math 221 or Math 293.

COM S 280 Discrete Structures
Fall or spring. 4 credits. Prerequisite: Computer Science 211 or 212 or permission of instructor.

COM S 314 Introduction to Digital Systems and Computer Organization
Fall, spring, or summer. 4 credits. Prerequisite: Computer Science 211 or 212 or equivalent.

COM S 381 Introduction to Theory of Computing
Fall. 4 credits. Prerequisite: Computer Science 280 or permission of instructor.

COM S 400 The Science of Programming
Spring. 4 credits. Prerequisite: Computer Science 280 or equivalent. Not offered spring 1996; next offered spring 1997.

COM S 401 Software Engineering: Technology and Technique
Fall. 4 credits. Prerequisite: Computer Science 410 and knowledge of the C programming language.

COM S 410 Data Structures
Fall, spring, summer. 4 credits. Prerequisite: Computer Science 280 or permission of instructor.

COM S 411 Programming Languages and Logics
Fall. 4 credits. Prerequisites: Computer Science 410 or permission of instructor. Not offered fall 1995; next offered fall 1996 and 1998. 2 lecs.

COM S 412 Introduction to Compilers and Translators

COM S 413 Practicum in Compilers and Translators

COM S 414 Systems Programming and Operating Systems
Fall. 3 credits. Prerequisite: Computer Science 314 or permission of instructor.

COM S 415 Practicum in Operating Systems
Fall. 2 credits. Prerequisite: Computer Science 410. Corequisite: Computer Science 414.

COM S 417 Computer Graphics and Visualization (also ARCH 374)
Spring. 3 credits. Prerequisite: Computer Science 211 or 212.

COM S 418 Practicum in Computer Graphics (also ARCH 375)
Spring. 2 credits. Enrollment limited. Permission of instructor. Prerequisite: Computer Science 211 or 212. Recommended: Computer Science 314. Corequisite: Computer Science 417.

COM S 421 Numerical Analysis
Fall. 4 credits. Prerequisites: Mathematics 294 or equivalent, one additional mathematics course numbered 300 or above, and knowledge of programming.
COM S 422 Parallel Computing for Scientific Problems  
Spring. 4 credits. Enrollment limited. Permission on instructor. Prerequisites: Math 294 and COM S 222 or COM S 421, knowledge of C and Fortran.

COM S 432 Introduction to Database Systems  
Spring. 3 credits. Prerequisites: Computer Science 211 or 212 and Computer Science 410, or permission of instructor. Recommended: Computer Science 314.

COM S 433 Practicum in Database Systems  
Spring. 2 credits. Corequisite: Computer Science 432.

[COM S 444 Distributed Systems and Algorithms  
Fall. 4 credits. Co-requisite: COM S 414 or permission of instructor. Not offered fall 1995; next offered fall 1996.]

[COM S 462 Robotics and Machine Vision  
Spring. 3 credits. Prerequisite: Permission of instructor, Computer Science 410 and Computer Science 381. Co-requisite: Computer Science 463. Not offered spring 1996; next offered spring 1997.]

[COM S 463 Robotics and Machine Vision Lab  
Spring. 2 credits. Prerequisites: Permission of instructor, Computer Science 410 and Computer Science 381. Co-requisite: Computer Science 462. Not offered spring 1996; next offered spring 1997.]

COM S 472 Foundations of Artificial Intelligence  
Fall. 3 credits. Prerequisites: Computer Science 107 or 212, Computer Science 280 and Computer Science 410. Open to juniors, seniors, and graduate students.

COM S 473 Practicum in Artificial Intelligence  
Fall. 2 credits. Prerequisites: Computer Science 107 or 212, Computer Science 280 and 410. Corequisite: Computer Science 472.

COM S 481 Introduction to Theory of Computing  
Fall. 4 credits. Prerequisite: Computer Science 280 or permission of instructor. Credit will not be granted for both Computer Science 381 and Computer Science 481. A faster-moving and deeper version of Computer Science 381. Corrective transfers between Computer Science 481 and 381 (in either direction) are encouraged during the first few weeks of instruction.

COM S 482 Introduction to Analysis of Algorithms  
Spring. 4 credits. Prerequisites: Computer Science 410 and Computer Science 381 or 481, or permission of instructor.

COM S 486 Applied Logic (also Mathematics 486)  
Fall or spring. 4 credits. Prerequisites: Mathematics 222 or 294, Computer Science 100, and some course in mathematics or theoretical computer science.

COM S 490 Independent Reading and Research  
Fall or spring. 1–4 credits.

COM S 501 Software Engineering: Technology and Technique  
Fall. 4 credits. Prerequisite: COM S 410 and knowledge of the C programming language.

[COM S 511 Modern Programming Languages  
Fall. 4 credits. Prerequisites: Computer Science 410 and a project course or permission of instructor. Not offered fall 1995; next offered fall 1996 and 1998.]

COM S 514 Practical Distributed Computing  
Fall or spring. 4 credits. Prerequisites: Computer Science 414 or permission of instructor. Not offered every year; semester to be announced.

COM S 515 Practicum in Distributed Systems  
Fall or spring. 1–2 credits. Co-requisite: COM S 514. Not offered every year; semester to be announced.

COM S 516 High-Performance Computer Architecture  
Spring. 4 credits. Prerequisite: COM S 314 required. COMS 412 or 414 highly recommended.

COM S 522 Parallel Computing for Scientific Problems  
Spring. 4 credits. Enrollment limited. Permission of instructor. Prerequisites: Math 294, COM S 222 or COM S 421, knowledge of C and FORTRAN.

[COM S 562 Robotics and Machine Vision  
Spring. 3 credits. Prerequisites: permission of instructor, COM S 410 and COM S 381/481. Co-requisite: COM S 563. Not offered spring 1996; next offered spring 1997.]

[COM S 563 Robotics and Machine Vision Lab  
Spring. 2 credits. Prerequisites: permission of instructor, COM S 410 and COMS 381/481. Co-requisite: COM S 562. Not offered spring 1996; next offered spring 1997.]

COM S 572 Introduction to Automated Reasoning  
Spring. 3 credits.

COM S 600 Computer Science and Programming  
Fall. 1 credit. Prerequisite: graduate standing in computer science or permission of instructor. Not offered every year; semester to be announced.

COM S 611 Advanced Programming Languages  
Fall. 4 credits. Prerequisites: Computer Science 410, and 381 or 481, or permission of instructor.

COM S 612 Compiler Design for High-Performance Architectures  
Spring. 4 credits. Prerequisites: Computer Science 314 and 412, or permission of instructor.

COM S 613 Concurrent Programming  
Spring. 4 credits. Prerequisites: Computer Science 414 or permission of instructor. Not offered every year; semester to be announced.

COM S 614 Advanced Systems  
Spring. 4 credits. Prerequisite: Computer Science 414 or permission of instructor.

COM S 615 Theory of Concurrent Systems  
Spring. 4 credits. Prerequisites: COM S 611 or permission of instructor. Not offered every year; semester to be announced.

COM S 617 Frontiers of Parallel Computer Systems  
Fall. 4 credits. Prerequisites: COM S 314 or 516 required, COM S 411, 412, or 414. Not offered every year; semester to be announced.

COM S 618 Topics in the Theory of Distributed Systems  
Fall. 4 credits. Prerequisites: COM S 444 or COM S 614 or permission of instructor. Not offered every year; next offered fall 1995.

COM S 621 Matrix Computations  
Fall. 4 credits. Prerequisites: COM S 444 or COM S 614 or permission of instructor.

COM S 622 Numerical Optimization and Nonlinear Algebraic Equations  
Spring. 4 credits. Prerequisite: COM S 621.

COM S 624 Numerical Solution of Differential Equations  
Spring. 4 credits. Prerequisite: Previous exposure to numerical analysis, mathematical analysis including Fourier methods, and differential equations. Not offered every year; semester to be announced.

COM S 631 Multimedia Systems  
Fall. 4 credits. Prerequisite: Computer Science 414 or permission of instructor.

COM S 635 Automatic Text Processing and Information Retrieval  
Spring. 4 credits. Prerequisite: Computer Science 410 or equivalent or permission of instructor. Letter grade only.

COM S 661 Robotics  
Fall. 4 credits. Prerequisites: Computer Science 482 and permission of instructor. Not offered every year; semester to be announced.

COM S 662 Robotics Laboratory  
Fall. 4 credits. Prerequisite: graduate standing or permission of instructor. Not offered every year; semester to be announced.

COM S 664 Machine Vision  
Spring. 4 credits. Prerequisites: undergraduate-level understanding of algorithms and Mathematics 221 or equivalent.

COM S 672 Advanced Artificial Intelligence  
Spring. 4 credits. Prerequisites: Computer Science 472 or permission of instructor. Not offered every year; semester to be announced.

COM S 681 Analysis of Algorithms  
Fall. 4 credits. Prerequisite: Computer Science 381 or 481, or permission of instructor.

COM S 682 Theory of Computing  
Spring. 4 credits. Prerequisite: Computer Science 381 or 481, or permission of instructor.
COM S 683 Parallel Algorithms  
Fall. 4 credits. Prerequisite: COM S 681. Not offered every year; semester to be announced.

COM S 684 Introduction to Symbolic Computation  
4 credits. Prerequisites: Computer Science 381 or 481, or permission of instructor. Not offered every year; semester to be announced.

COM S 685 Computational Geometry  
Fall. 4 credits. Prerequisites: COM S 681, or permission of instructor. Not offered every year; semester to be announced.

COM S 709 Computer Science Colloquium  
Fall or spring. 1 credit. S-U grades only. For staff, visitors, and graduate students interested in computer science.

COM S 713 Seminar in Systems and Methodology  
Fall, spring. 4 credits. Prerequisites: a graduate course employing formal reasoning, such as COM S 600, 611, 613, 615, 671, a logic course, or permission of instructor. Not offered every year; semester to be announced.

COM S 715 Seminar in Programming Refinement Logics  
Fall or spring. 4 credits. Prerequisite: permission of instructor.

COM S 717 Topics in Parallel Architectures  
Fall. 4 credits. Prerequisite: Computer Science 612 or permission of instructor. Not offered every year; semester to be announced.

COM S 718 Topics in Computer Graphics  
Fall or spring. 4 credits. Prerequisites: COM S 417 or permission of instructor. Not offered every year; semester to be announced.

COM S 719 Seminar in Programming Languages  
Fall or spring. 4 credits. Prerequisite: Computer Science 611 or permission of instructor. S-U grades only.

COM S 722 Topics in Numerical Analysis  
Fall or spring. 4 credits. Prerequisite: Computer Science 621 or 622 or permission of instructor. Not offered every year; semester to be announced.

COM S 725 Seminar in Work in Progress: Robotics, Artificial Intelligence, and Psychgology  
Fall or spring. 1—4 credits (to be arranged). Prerequisite: permission of instructor. S-U grades only. Doctoral research.

COM S 762 Robot Cafe  
Spring. 4 credits. Prerequisite: CS661. Not offered every year; semester to be announced. Advanced seminar on varying topics.

COM S 773/774 Proseminar in Cognitive Studies I & II (also Cognitive Studies, Philosophy, Linguistics, and Psychology 773/774)  
Fall and spring. 2 credits.

COM S 784 Seminar in Computational Algebra  
Fall or spring. 4 credits. Not offered every year; semester to be announced. Informal weekly seminar in which current topics in computational algebra and symbolic mathematics are discussed.

COM S 789 Seminar in Theory of Algorithms and Computing  
Fall, spring. 2-4 credits. Prerequisite: permission of instructor. S-U grades only.

COM S 790 Special Investigations in Computer Science  
Fall, spring. Prerequisite: permission of a computer science adviser. Letter grade only. Independent research or Master of Engineering project.

COM S 890 Special Investigations in Computer Science  
Fall, spring. Prerequisite: permission of a computer science adviser. S-U grades only.

DANCE  
See listings under Department of Theatre Arts.

DUTCH  
See Modern Languages and Linguistics.

ECONOMICS  

The study of economics provides an understanding of the way economies operate and an insight into public issues. The department offers a broad range of undergraduate courses in such fields as macroeconomics and banking international and comparative economics; econometrics; theory, history; growth and development; and the organization, performance, and control of industry.

Social Science Distribution Requirement  
The microeconomics distribution requirement can be fulfilled with any of the following: Economics 101, Economics 201, Econometrics 203, or Economics 313. The macroeconomics distribution requirement can be satisfied with any of the following: Economics 102, Economics 202, Economics 204, or Economics 314.

The Major  
Students who wish to major in economics must have completed Economics 101 or Economics 203 and Economics 102 or Economics 204 or equivalent courses, and Mathematics 111, or its equivalent. A grade below a C will not be accepted for any of the above. Economics 203 (with a grade of B or better) satisfies both the introductory micro (Economics 101) and the intermediate micro (Economics 313) requirement. Similarly Economics 204 (with a grade of B or better) satisfies both the introductory macro (Economics 102) and intermediate macro (Economics 314) requirement.

Prospective majors should apply at the department office. The requirements for the major beyond the introductory courses and Math 111 are:

(1) Economics 313 (or Economics 203 with grade of B or better)  
(2) Econometrics 204 (or Economics 204 with grade of B or better)  
(3) Economics 319 or Economics 321, and
(4) 5 other economics courses listed by the Department of Economics or approved by the major adviser, except that Economics 399 (Independent Study) and Economics 499 (Honors Program) cannot be used to fulfill this requirement.

(5) Unless otherwise noted a course grade of C- or better must be achieved for the course to be applied to satisfying the major requirements.

An honors program is currently being offered. Students should consult the director of undergraduate studies before May of their junior year for more information.

Students planning graduate work in economics or business are strongly encouraged to prepare themselves well in mathematics and econometrics. These students are strongly encouraged to enroll in Economics 319–320 rather than Economics 321.

Courses

ECON 101 Introductory Microeconomics  
Fall, spring, and summer. 3 credits.
Economics 101 is not a prerequisite for 102. Explanation and evaluation of how the price system operates in determining what goods are produced, how goods are produced, and who receives income, and how the price system is modified and influenced by private organizations and government policy.

ECON 102 Introductory Macroeconomics  
Fall, spring, and summer. 3 credits.
Economics 101 is not a prerequisite for 102. Analysis of aggregate economic activity in relation to the level, stability, and growth of the economy.
national income. Topics discussed may include the determination and effects of unemployment, inflation, balance of payments, deficits, and economic development, and how these may be influenced by monetary, fiscal, and other policies.

**ECON 101 Introduction to Economic Analysis**

Spring. 4 credits.

This course will introduce the student to the basic tools of microeconomic and macroeconomic theory necessary to understand and analyze contemporary economic problems and their proposed solutions. In particular, the allocative role of the price system in determining production, consumption, and the distribution of income will be analyzed. The course will also focus on aggregate economic activity in relation to the level, stability, and growth of national income and other measures like unemployment, inflation, the deficit, and balance of payments. We will also develop awareness of the strengths and weaknesses of markets and how the price system and aggregate economy are modified and influenced by private organizations and government policy at both the micro and macro levels of analysis. (Cannot be applied to the economics major.)

**ECON 203 Microeconomics**

Fall. 4 credits. Prerequisite: calculus.

Intended for students with strong analytical skills who have not taken Economics 101, 102, 201, or 202. Can be used to replace both Economics 101 and 313. (Can replace 313 only with grade of B or better). This course covers the topics taught in Economics 101 and 313. An introduction to the theory of consumer and producer behavior and to the functioning of the price system.

**ECON 204 Macroeconomics**

Spring. 4 credits. Prerequisite: Economics 203.

Intended for students with strong analytical skills who have not taken Economics 101, 102, 201, or 202. Can be used to replace both Economics 102 and 314. This course covers the topics taught in Economics 102 and 314. (Can replace 314 only with grade of B or better). An introduction to the theory of national income determination, unemployment, growth, and inflation.

**ECON 301 Economics of Market Failure**


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 redistributational objectives; (f) direct and indirect taxation as instruments of redistribution.

**ECON 303 Positive and Normative Theories of Income Distribution**

Spring. 4 credits. Cannot be applied to the major. Not offered 1995-96. After examining the distinction between the terms positive and normative as used in economics, this course will explore three main questions: (1) Why is income distributed the way it is? (2) How should income be distributed? (3) What is the relationship between 1 and 2? Particular emphasis will be given to those theories of income distribution, both positive and normative, that tend to dominate discussion of these topics in America.

**ECON 304 Economics and the Law**

Spring. 4 credits. Prerequisite: Economics 101.

An examination, through the lens of economic analysis, of legal principles drawn from various branches of law, including contracts, torts, and property. Cases are assigned for class discussion; in addition, there are several writing assignments.

**ECON 306 Economics of Defense Spending**


The economic aspects of defense spending are analyzed. Particular emphasis is on the procurement of weapons systems. Topics covered include an overview of the defense budget, special characteristics of the defense market, the structure of the defense industry, and the economic behavior of defense firms.

**ECON 308 Economic Analysis of Government (also Civil and Environmental Engineering 322)**

Spring. 4 credits. Prerequisites: calculus plus Economics 313 or equivalent or Civil and Environmental Engineering 321. Not offered 1995-96. Analysis of economic bases for government intervention in a market economy. Topics include public goods, cost-benefit analysis, public finance, environment regulation and risk management, and macroeconomic topics.

**ECON 309 Environmental Economics**

Fall. 4 credits. Prerequisites: Economics 101-102.

This course examines the economic aspects of environmental issues. We will look at theoretical and analytical tools of economics as they apply to environmental issues, as well as related philosophical and ethical issues. We will then apply the various economic and ethical paradigms to current environmental issues.

**ECON 310 Economics of Market Failure**


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 redistributational objectives; (f) direct and indirect taxation as instruments of redistribution.

**ECON 311 Intermediate Microeconomic Theory**

Fall, spring, and summer. 4 credits. Prerequisites: Economics 101-102 and calculus.

The pricing process in a private enterprise economy are analyzed under varying competitive conditions, and their role in the allocation of labor and resources and the functional distribution of national income is considered.

**ECON 314 Intermediate Macroeconomic Theory**

Fall, spring, and summer. 4 credits. Prerequisites: Economics 101-102 and calculus.

The theory of national income and determination and economic growth in alternative models of the national economy is introduced. The interaction and relation of these models to empirical aggregate economic data is examined.

**ECON 315 History of Economic Analysis**

Fall. 4 credits. Prerequisites: Economics 101-102 or permission of instructor.

Early writings in economics and their relationship to current economic analysis and policy issues, for example, ancient and medieval philosophers on justice in exchange; mercantilist arguments for trade protection; early theories about the effect of monetary expansion (D. Hume); the role of the entrepreneur (Cantillon); and general competitive equilibrium (the Physiocrats). The most recent teaching assignment in this course is Adam Smith's Wealth of Nations but the emphasis is on the relationship between the precursors of Adam Smith and his Wealth of Nations to modern economics analysis and current efforts to answer some of the questions raised in the early writing on economics.

**ECON 317 Intermediate Mathematical Economics I**


Introduction of calculus and matrix algebra; problems of maximization of a function of several variables. Economic examples are used to illustrate and teach the mathematical concepts.

**ECON 318 Intermediate Mathematical Economics II**


Advanced techniques of optimization and application to economic theory.

**ECON 319 Introduction to Statistics and Probability**

Fall. 4 credits. Prerequisites: Economics 101-102 and Mathematics 111-112.

This course provides an introduction to statistical inference and to principles of probability. It includes descriptive statistics, principles of probability, discrete and continuous distributions, and hypothesis testing (of sample means, proportions, variance). Regression analysis and correlation are introduced.

**ECON 320 Introduction to Econometrics**

Spring. 4 credits. Prerequisites: Economics 101-102, 319, or equivalent.

Introduction to the theory and application of econometric techniques. How econometric models are formulated, estimated, used to test hypotheses, and used to forecast; understanding economists' results in studies using regression model, multiple regression model, and introduction to simultaneous equation models.

**ECON 321 Applied Econometrics**

Fall or spring and summer. 4 credits. Prerequisites: Economics 101-102 and calculus.

This course provides an introduction to statistical methods and principles of probability. Topics to be covered include analysis of data, probability concepts and distributions, estimation and hypothesis testing, regression, correlation and time series analysis. Applications from economics are used to illustrate the methods covered in the course.
ECON 323 American Economic History #
Fall. 4 credits. Prerequisites: Economics 101–102 or equivalent.
Problems in American economic history from the first settlements to early industrialization are surveyed.

ECON 324 American Economic History #
Spring. 4 credits. Prerequisites: Economics 101–102 or equivalent.
A survey of problems in American economic history from the Civil War to World War I.

ECON 324A American Economic History #
Spring. 4 credits. Prerequisites: Economics 101–102 or equivalent.
History of the changing structure of American business from 1800 to the present, with major emphasis upon developments after the Civil War. The focus of the course will be the changing structure of challenges (for example, the rise of unions, development of a national capital market, changing role of government) and the various responses of business organizations and entrepreneurs to those challenges.

ECON 326 History of American Enterprise #
Fall. 4 credits. Prerequisites: Economics 101–102 or equivalent.
History of the changing structure of American business from 1800 to the present, with major emphasis upon developments after the Civil War. The focus of the course will be the changing structure of challenges (for example, the rise of unions, development of a national capital market, changing role of government) and the various responses of business organizations and entrepreneurs to those challenges.

ECON 331 Money and Credit
Fall. 4 credits. Prerequisites: Economics 101-102 and 313.
A systematic treatment of the determinants of the money supply and the volume of credit. Economic analysis of credit markets and financial institutions in the United States.

ECON 333 Financial Economics
Spring. 4 credits. Prerequisites: Economics 313 and 314.
The theory and decision making in the presence of uncertainty and the practical aspects of particular asset markets are examined.

ECON 335 Public Finance: The Microeconomics of Government
Fall. 4 credits. Prerequisites: Economics 101–102 and 313, or their equivalent, and one semester of calculus.
The role of government in a free market economy is analyzed. Topics covered include public goods, market failures, allocation mechanisms, optimal taxation, effects of taxation, and benefit-cost analysis. Current topics of an applied nature will vary from term to term.

ECON 336 Public Finance: Resource Allocation and Fiscal Policy
Spring. 4 credits. Prerequisites: Economics 101–102 and 313 or their equivalent and one semester of calculus.
This course covers the revenue side of public finance and special topics. Subjects covered include the federal debt, the budget, and government regulation and transfers, as well as problems like local public goods, health care, education, the hierarchy of governmental structure, plus a variety of applied problems.

ECON 338 Macroeconomic Policy
Spring. 4 credits. Prerequisite: Economics 314 or equivalent. Not offered 1995–96.
The use of fiscal and monetary policies for achieving full employment, price-level stability, and appropriate economic growth are studied.

ECON 341 Labor Economics
For description, see ILRLE 240.

ECON 342 Economic Analysis of the Money Supply and the Volume of Credit.
Spring. 4 credits. Prerequisite: Economics 313 or its equivalent.
A study of markets that differ from the ideal of perfect competition (e.g., monopoly and oligopoly) and the efforts of our legal system through the antitrust laws to deal with the kinds of problems that arise in such markets. Specific topics covered include mergers, price fixing, price discrimination, predatory pricing, and vertical restraints such as resale price maintenance.

ECON 352 Advanced Topics in Industrial Organization
Spring. 4 credits. Prerequisites: Economics 351.
This course is an extension of 351 and will emphasize (a) more advanced topics in the theory of industrial organization with special attention to recent developments in the literature; and (b) empirical analysis of numerous issues relating to the structure of markets and their performance.

ECON 355 Departures from Rational Choice
Fall. 4 credits. Prerequisites: Economics 313 and 314, or their equivalents. Not offered 1995–96.
This course examines behaviors that appear inconsistent with the traditional theory of rational choice. These behaviors fall under two broad categories: (1) irrational behavior with regret, and (2) irrational behavior without regret. The first category includes, but is not limited to, behaviors that result from cognitive errors. Once people are made aware of these errors, they typically express a desire to modify their behavior in the directions called for by rational choice theory. The second category represents a deeper challenge to the traditional model. It consists of behaviors that people generally express no desire to modify despite their inconsistency with rational choice theory.

ECON 357 Game Theory
Spring. 4 credits. Prerequisites: Economics 313 and 319. Not offered 1995–96. This course studies mathematical models of conflict and cooperation in situations of uncertainty (about nature and about decision makers).

ECON 361 International Trade Theory and Policy
Fall. 4 credits. Prerequisites: Economics 101–102 or their equivalent.
This course surveys the sources of comparative advantage. It studies commercial policy and analyzes the welfare economics of trade between countries. Some attention is paid to the institutional aspects of the world trading system.

ECON 366 The Economies of the Former Soviet Union and of Central Europe: From Central Planning to Markets
Fall. 4 credits. Prerequisites: Economics 313 and 314. Not offered 1995–96.
The course will introduce first the basic features of a centrally planned economy and proceed to consider the most important example: the rise and fall of the Soviet Union. Secondly, the analysis will be extended to what used to be known as "Eastern Europe" (e.g., Czechoslovakia, Hungary, Poland). From this necessary historical background, the course will proceed to current attempts to move away from Socialist central planning and its legacies to market economy, privatization, and independence.

ECON 367 Comparative Economic Systems: East and West
Fall. 4 credits. Prerequisites: Economics 101–102.
The course will develop first a framework for studying economic systems and national economies and present three simple stylized systemic models: capitalist market, socialist market, and central planning. Secondly, the course will consider economic goals that tend to be achieved (such as growth, stability, and productivity) and introduce quantitative measures used in the evaluation of the performance. Thirdly, comparative studies of selected national economies representing the models will be carried out.

ECON 369 The Economy of China
Fall. 4 credits. Prerequisites: Economics 101–102 or permission of instructor.
Examines the development of the Chinese economy and the evolution of China's economic system since 1949.
ECON 370  Socialist Economies in Transition  
Fall. 4 credits. Prerequisites: Economics 101-102 and 313-314.  
This course studies the economic aspects of the transition of centrally planned, socialist economies to capitalist, market economies. It begins with an overview of the functioning of centrally planned economies, the arguments for reform, and experience with reform of these economies prior to 1989. This background section provides an understanding of the issues relating to reform. The focus then shifts to the consequences of reform in the reforming economies. We examine the key elements of the reform process, including macroeconomic stabilization and price liberalization, tax reform, development of capital markets, and privatization of firms. We study the economic arguments relating to each of these aspects of reform and compare experiences with reform in different countries.

ECON 371  Economic Development  
Fall. 4 credits. Prerequisites: Economics 313 or equivalent.  
Study of the problem of sustaining accelerated economic growth in the less-developed countries. Trade-offs between growth, welfare, and equity; the legacy of colonialism; relevance of history and economic theory; problems of capital formation, economic planning and international specialization, and the interaction of industrialization, agricultural development, and population change are emphasized.

ECON 372  Applied Economic Development  
Fall or spring. 4 credits. Prerequisite: Economics 313.  
This course examines several special topics in the economics of developing countries. Among the topics covered recently are the concepts of development and underdevelopment, the debate over development economics, the peasant household and its place in the world economy, the debt crisis, the state vs. market debate and the role of the state in economic development, and the question of sustainable development.

ECON 374  National and International Food Economics  
For description, see NS 457.

ECON 375  Economic Problems of India  
Fall. 4 credits. Prerequisite: Economics 101/102 or equivalent background.  
This course will present the major economic and development problems of contemporary India and to examine the country's future economic prospects. It will, however, be our aim to discuss these problems in their proper historical perspectives. Hence, the course will start with a brief outline of the social and political history of India. It will then turn to a more detailed account of the economic history of India in two stages.

ECON 381  Economics of Participation and Workers' Management  
Spring. 4 credits. Prerequisites: Economics 313-314 or permission of instructor.  
The theory of labor-management economies is developed systematically, and literature on that and related subjects surveyed. Theories of the participatory firm, industry, and general equilibrium are covered together with a microeconomic theory and analysis of special dimensions of the system. Efficient decision-making processes within the firm are also studied. Illustrative references to Yugoslavian and other real instances of labor participation are made throughout.

ECON 382  The Practice and Implementation of Self-Management  
Fall. 4 credits. Prerequisites: Economics 101-102.  
A broad introduction to the subject of workers' self-management intended for both economists and non-economists. It contains no technical tools nor does it require prior professional knowledge: thus there are no prerequisites. The course objective is to answer 5 broad questions: (1) What is self-management? (2) Where and in what form does it occur? (3) What is its history? (4) How does it work? and (5) How is a cooperative enterprise/economy started/operated?

ECON 399  Readings in Economics  
Fall or spring. Variable credit. Independent study.

ECON 416  Intertemporal Economics  
This course is intended for advanced economics majors who are especially interested in economic theory. Topics to be covered: (a) review of the one good Ramsey model of optimal savings and accumulation; conditions for intertemporal efficiency in production; comparative dynamics and sensitivity analysis; (b) some earlier models of capital accumulation; the roles of present value and internal rate of return in guiding investment decisions; (c) growth, exhaustive resources; pollution and conservation; discussion of the trade-offs facing a society.

ECON 419  Economic Decisions under Uncertainty  
Fall. 4 credits. Prerequisites: Economics 313 and 319. Not offered 1995–96.  
This course provides an introduction to the theory of decision making under uncertainty with emphasis on economic applications of the theory.

ECON 422  The Economics of Infrastructure and a Sustainable Environment  
For description, see CEE 422.

ECON 436  Projects in Environmental Management  
For description, see NBA 573.

ECON 445  Topics in Microeconomic Analysis—Markets and Planning  
Fall. 4 credits. Prerequisites: Economics 313.  
This is a course of economic theory designed for upperclass undergraduates. Course contents may vary from year to year. Issues that may be examined include (1) How can economic activities be efficiently organized through the market mechanism? Why is the presence of many traders essential to efficiency? (2) What can be done if the indivisibility in production processes becomes an important hindrance to competitive pricing? (3) How can economic planning be decentralized efficiently? This course serves two purposes: (1) to introduce concepts that are novel to undergraduates and relevant to public policy but require only a modicum of analytic tooling up, and (2) to illustrate the deductive approach of modern economic analysis—how to define concepts unambiguously, how to form propositions in clear-cut fashion, and how to follow up logical implications sequentially to the conclusion.

ECON 446  Topics in Macroeconomic Analysis—Is Keynesianism Dead?  
Fall or spring. 4 credits. Prerequisites: Economics 314. Not offered 1995–96.  
The coverage of this course may vary from term to term. Presently the content of the course deals with the range of criticisms against Keynesian theory by the New Classical Economics, alias the Equilibrium School, alias the Rational Expectations School. Despite the fact that almost all intermediate macroeconomic textbooks are Keynesian in perspective, clearly Keynesian economics is currently at bay. We shall review critically, critiques to Keynesian theory.

ECON 473  Economics of Export-led Development  
Spring. 4 credits. Prerequisites: Economics 315, 314, or their equivalent.  
This course will examine the phenomenon of export-led development from both the theoretical and empirical points of view. Concentration will be on experiences within the West Pacific Rim.

ECON 481  Economic Effects of Participation and Labor-Managed Systems  
Fall or spring. 4 credits. Prerequisites: Economics 381 and 382. Not offered 1995–96.  
This course applies microeconomic theory to analyzing the performance of firms in which employees either participate in the decision-making process or make all the important decisions. If a specialist in the area is lacking, Prof. Vanek may give the course as a seminar where primarily grad students will discuss topics in the literature selected through consensus of the participants.

ECON 482  Practical Aspects of Business Management of Worker Enterprises  
Fall. 4 credits. Prerequisite: should be taken concurrently with or following Economics 382/582, and permission of instructor.  
This course is designed to further and deepen undergraduate and graduate students' knowledge of workers' self-management democratic enterprises. It will be based primarily on dialogue and participants' own presentations of their research in relevant areas such as cooperative business law, finance, accounting, or internal work organization. The instructor will act primarily as a coordinator and resource person. Whenever possible an attempt is made to form and incorporate a self-managing cooperative enterprise. Students who have taken all three courses, Economics 381/681, 382/682, and 482, both graduate and undergraduate, are welcome to participate as teaching-student interns. They may receive additional independent study credit for this work.

ECON 483  The Technological and Product Base of Worker Enterprises, with Special Emphasis on Ecology and Solar Energy Applications  
Fall or spring. 4 credits. Prerequisite: may be taken concurrently with or following Economics 382/582, and permission of instructor. Not offered 1995–96.  
This course is designed to deepen undergraduate and graduate students' knowledge of workers' self-management and cooperation,
ECON 499 Honors Program
Fall and spring. 8 credits.
Consult the Director of Undergraduate Studies for details. Interested students should apply to the program in the spring semester of their junior year.

Graduate Courses and Seminars
ECON 509 Microeconomic Theory I
Fall. 4 credits.
Topics in consumer and producer theory.

ECON 510 Microeconomic Theory II
Spring. 4 credits.
Topics in consumer and producer theory, equilibrium models and their application, externalities and public goods, intertemporal choice, simple dynamic models and resource depletion, choice under uncertainty.

ECON 513 Macroeconomic Theory: Static Income Determination
Fall. 4 credits.

ECON 514 Macroeconomic Theory: Dynamic Models, Growth, and Inflation
Spring. 4 credits.

ECON 516 Applied Price Theory
Spring. 4 credits.
The course emphasizes the applications of the principles of price theory to a variety of problems taken from concrete, practical settings.

ECON 517 Intermediate Mathematical Economics I
Fall. 4 credits.

ECON 518 Intermediate Mathematical Economics II
Spring. 4 credits.

ECON 519 Econometrics I
Fall. 4 credits. Prerequisites: Economics 519–520 or permission of instructor.
This course is a continuation of Economics 519 (Econometrics I) covering (1) statistics: sample statistics, sufficiency, theory: probability spaces, random variables, distributions, moments, transformations, conditional distributions, distribution theory and the multivariate normal distribution, convergence concepts, laws of large numbers, central limit theorems. Monte Carlo simulation; (2) statistics: descriptive statistics, sufficiency, exponential families of distributions. Further topics in statistics will be considered in Economics 520.

ECON 520 Econometrics II
Spring. 4 credits. Prerequisite: Economics 519.
This course is a continuation of Economics 519 (Econometrics I) covering (1) statistics: estimation theory, least squares methods, method of maximum likelihood, generalized method of moments, theory of hypothesis testing, asymptotic test theory, and nonnested hypothesis testing and (2) econometrics: the general linear model, generalized least squares, specification tests, instrumental variables, dynamic regression models, linear simultaneous equation models, nonlinear models, and applications.

ECON 537 Economics of Financial Market Regulation
Fall. 4 credits. Prerequisites: ECON 313 and 314 and the consent of the instructor. Not offered 1995–96.
The course emphasizes applications of econometric theory to a variety of regulatory issues. Topics include: forecasting and regulatory policy; identification and quantification of market power; microeconomic and macroeconomic approaches to market structure and performance; information, evidence, and regulation.

ECON 555 Economic Problems of Latin America
Spring. 4 credits.
For description see Economics 365.

ECON 581 Economics of Participation and Work Management
For description see Economics 381.

ECON 582 The Practice and Implementation of Self-Management
Fall. 4 credits. Not offered 1995–96.
For description see Economics 382.

ECON 599 Readings in Economics
Fall or spring. Variable credit.
Independent study.

ECON 603 Seminar in Peace Science
Fall. 4 credits. Not offered 1995–96.
ECON 605 Advanced Social Theory for Peace Scientists
Spring. 4 credits. Prerequisites: Economics 505 and knowledge of microeconomic theory. Not offered 1995–96.
Study of diverse social science hypotheses and theories as they relate to, and can be synthesized within, multiregional, multinational, and generally multigovernment cooperation and cooperative frameworks. Particular attention will be given to developments stemming from microeconomics and general systems theory. Dynamic analyses will be emphasized.

ECON 610 Stochastic Economics: Concepts and Techniques
Spring. 4 credits. Prerequisites: Economics 509, 510, 513, 514, 519, and 520.
This course is a continuation of Economics 509 (Econometrics I) covering (1) statistics: estimation theory, least squares methods, method of maximum likelihood, generalized method of moments, theory of hypothesis testing, asymptotic test theory, and nonnested hypothesis testing and (2) econometrics: the general linear model, generalized least squares, specification tests, instrumental variables, dynamic regression models, linear simultaneous equation models, nonlinear models, and applications.
ECON 641 Seminar in Labor Economics
For description see ILRLE 744.

ECON 642 Seminar in Labor Economics
For description see ILRLE 745.

ECON 644 The Labor Market and Public Policy: A Comparative View
Fall or spring. 4 credits.

ECON 647 Economics of Evaluation (also Industrial and Labor Relations 647)
For description see ILRLE 647.

ECON 648 Issues in Latin America
Fall. 4 credits.

ECON 651 Industrial Organization and Regulation
Fall. 4 credits.

ECON 652 Industrial Organization and Regulation
Spring. 4 credits.

[ECON 653 Public Policy Issues for Industrial Organizations

The course takes an in-depth view of the interaction between the government and business. Methods of business control, including antitrust, price regulation, entry regulation, and safety regulation. Emphasis will be not only on the economic effects on business, but on the economics of selecting and evolving the method of control.

ECON 655 Rivalry and Cooperation
Fall. 4 credits. Prerequisites: Economics Graduate Core or instructor's permission.


In standard models, economic interaction is impersonal. Agents respond to price signals and measure their own welfare not in relative but in absolute terms; and cooperative behavior emerges only when it coincides with narrow self-interest. This course will explore the details of rivalry and cooperation in an effort to synthesize broader views of economic interaction. Topics will include the effect of concerns about relative income on wage rates, consumption, savings, and regulation; the effect of concerns about fairness on prices and wages; the conditions that foster trust and cooperation; and the role of positional competition in the distribution of economic rewards.

ECON 656 Noncooperative Game Theory
Fall. 4 credits. Prerequisites: Economics 509–510 and 519.

This course surveys equilibrium concepts for non-cooperative games. We will cover Nash equilibrium and a variety of equilibrium refinements, including perfect equilibrium, proper equilibrium, sequential equilibrium and more! We will pay attention to important special classes of games, including bargaining games, signalling games, and games of incomplete information. Most of our analysis will be from the strict decision-theoretic point of view, but we will also survey some models of bounded rationality in games, including games played by automata.

ECON 657 Economics of Imperfect Information
Spring. 4 credits. Prerequisites: Econom­ics 509–510 and 519.

The purpose of this course is to consider some major topics in the economics of uncertain information. Although the precise topics considered will vary from year to year, subjects such as markets with asymmetric information, signalling theory, sequential choice theory, and record theory will be discussed.

ECON 660 Topics in Political Economy
Fall. 4 credits. Prerequisite: Economics 513 or equivalent.

This course will develop critiques and extensions of economic theory, taking into account the political and social moorings of economic activity and equilibria. The formation and persistence of social norms; the meaning and emergence of property rights; the role of policy advice in influencing economic outcomes; and the effect of political power and ideology on economic variables will be studied. While these topics were popular in the classic works of political economy, recent advances in game theory and, more generally, game-theoretic thinking allows us to approach these topics from a new perspective. Hence, the course will begin by devoting some lectures to elementary ideas in game-theory and strategic analysis.

ECON 661 International Economics: Trade Theory and Policy
Fall. 4 credits.

This course surveys the sources of comparative advantage. It analyzes simple general equilibrium models to illustrate the direction, volume, and welfare effects of trade. Topics in game theory and econometrics as applied to international economics may be covered.

ECON 662 International Economics: International Finance and Open Economy Macroeconomics
Spring. 4 credits.

This course surveys the determination of exchange rates and theories of balance of payment adjustments. It explores open economy macroeconomics by analyzing models of monetary economies. Topics in monetary economics and econometrics as applied to international economics will be covered.

ECON 664 International Economics: Balance of Payments and International Finance
Fall or spring. 4 credits. Not offered 1995–96.

ECON 670 Economic Geography and Development
Fall or spring. 4 credits. Not offered 1995–96.

ECON 671 Economic Development and Development Planning
Spring. 4 credits.

Reviews the existing literature on the determinants of economic growth and the interrelationship between growth and income distribution through the process of economic development. A general equilibrium approach to development is taken. Computable general equilibrium models, based on social accounting matrices, are used to explore the performance of a variety of developing countries. Among the topics explored are: impact of structural adjustment and stabilization policies on growth, equity and internal and external equilibrium, sectoral interrelationship and interdependence through the growth process. Critical review and evaluation of national, sectoral and regional development models built for such developing countries as India, Brazil, Indonesia and Ecuador.

ECON 672 Economics of Development
Fall. 4 credits. Prerequisites: first-year graduate economic theory and econometrics.

Analytical approaches to the economic problems of developing nations. Topics to be covered include: some old and new directions in development economics thinking, the welfare economics of poverty and inequality, empirical evidence on who benefits from economic development, labor market models, project analysis with application to the economics of education, and development policy.

ECON 673 Economic Development
Fall or spring. 4 credits. Prerequisites: Economics 509 and 520. Not offered 1995–96.

The course is concerned with theoretical and applied works that seek to explain economic development, or lack thereof, in countries at low-income levels. Specific topics vary each semester.

ECON 674 Economic Systems
Fall. 4 credits.

ECON 675 Comparative Economic Organization and Institutions
Spring. 4 credits. Prerequisites: Econom­ics 314 and 351–352 or equivalent.

This course addresses problems of coordina­tion, management, finance, and organizational structure in firms and, to some extent, economies. It covers topics such as coordination mechanisms for production activity, problems arising in the control of subordinate agents' behavior, decision making within firms, internal firm organization, financial institutions and loan contracts, and the market for firm control. Course material draws from literature on mechanism design and from the fields of industrial organization, finance, and comparative systems.

ECON 677 Economic Growth in Southeast Asia
Fall or spring. 4 credits. Not offered 1995–96.

ECON 680 Economics of Participation and Self-Management
Fall. 4 credits. Prerequisites: Economics 101–102, or permission of instructor. Not offered 1995–96.

For description see Economics 381. Economics 681 is given on a more advanced graduate level.

ECON 682 Seminar on Economics of Participation and Labor-managed Systems
Fall. 4 credits. Not offered 1995–96.

ECON 684 Seminars in Advanced Economics
Fall and spring. 4 credits.
ENGLISH


The Department of English offers a wide range of courses in English, American, and Anglophone literature as well as in creative writing, expository writing, and film. Literature courses focus primarily on the close reading of texts, the study of particular authors and genres, questions of critical theory and method, and the relationship of literary works to their historical periods and to other disciplines. The department seeks not only to foster analytical reading and lucid writing but also, through the study of literary texts, to teach students to think about the nature of language, and to be alert to the rigors and pleasures of that ordinary and peculiar activity, reading.

Students who major in English develop their own programs of study in consultation with their advisers. Some focus on a particular historical period or literary genre; others combine sustained work in creative writing with the study of literature. Others pursue special interests in such areas as women's literature, Afro-American literature, literature and the visual arts, or critical theory.

There are also many ways for students informally to supplement their course work in English, by attending the frequent lectures and poetry readings sponsored by the department, or by writing for campus literary magazines.

The Major

Any student considering a major in English should meet with the department's director of undergraduate studies to discuss the major and to assume a major adviser. Copies of a brochure containing suggestions for English majors and prospective English majors are available in the department office, 250 Goldwin Smith Hall.

The Department of English recommends that its students ready themselves for the major by taking at least one preparatory course. Freshmen interested in majoring in English are encouraged to take one of the following freshmen seminars: The Reading of Fiction (English 270), The Reading of Poetry (English 271), or Introduzione all’ Italiano (English 272). First-year freshmen with a score of 700 or above on the CEEB College Placement Tests in English composition or literature or 4 or 5 on the CEEB Advanced Placement Examination in English may enroll in English 270, 271, 272 as space permits (all students who have taken one freshman seminar are permitted to enroll in these courses as space permits).

English 201 and 202, overviews of major British writers, though not required for the major, are strongly recommended for majors and prospective majors, since they afford an overview of the history of English literature, providing an introduction to periods, authors, and genres that allows students to make a more informed choice of advanced courses.

In addition, The American Literary Tradition (English 275) and the Essay in English (English 295) are especially suitable in preparation for the major.

Requirements

Each English major must complete with passing letter grades at least 36 credits in courses approved for the major. Students may count up to four courses for the major from the category entitled “200-level Courses Approved for the Major.” All English courses numbered 200 or above count toward the major. Of the 36 credits required for the major, 12 (three courses) must be taken in literature before 1800. (Courses taken for the English major may also be used to satisfy the arts college humanities distribution requirement or, in the case of creative writing courses, the expressive arts distribution requirement.)

A major, then, might normally consist of three or four courses at the 200 level, three or four at the 300 level, and a couple of 400-level seminars. A student's selection of courses will ideally display some historical breadth (as is reflected in the requirement of three courses in literature before 1800) and training in the reading of several kinds of literature (such as drama, poetry, and fiction). In their final semesters, English majors should be ready for advanced seminars in a more focused field of interest.

Foreign Language

English majors also are required to complete, with passing letter grades, six credits of foreign language study (or, in the case of foreign literatures in literature) in courses for which qualification is a prerequisite. Advanced placement credit does not fulfill this requirement, nor does the study of foreign literature in translation. Majors are urged to complete this requirement by the end of their sophomore year, and those who enter Cornell without sufficient preparation should begin their language study at once.

With the permission of their advisers, students may count towards the major a maximum of 12 credits in literature or creative writing courses at the 300 level or above given by such departments and programs as Comparative Literature, Theatre Arts, Romance Studies, the Africana Studies and Research Center, and the Society for the Humanities. Double majors may count toward these 12 credits any courses, 300 level or above, taken in their other major if such courses are approved by their English department adviser as relevant to the study of literature.

Honors

Prospective candidates for the degree of Bachelor of Arts with honors in English should read the handout “English Department Honors Program,” available in the English office. These students should discuss their qualifications with the chair of the Honors Committee during the spring term of their sophomore year, when they will be admitted provisionally to the program. During their junior year, honors candidates must take one honors seminar (English 491 or 492), which will reflect a dominant area of interest, address methods of scholarly research, and require the composition of a long end-of-term essay. Honors students are strongly encouraged to take an additional 400-level course in the field in which they plan to concentrate. On the basis of their performance, students will be officially admitted to the program at the end of the junior year. Seniors in honors enroll in a year-long tutorial (English 493 and 494) in which they work closely with a faculty member especially qualified to supervise the topic of the candidate's choosing; the year's work culminates in the writing of a scholarly honors thesis. (All seniors in the program are expected to attend informal sessions in which they discuss their work-in-progress.) More information about the program may be found in the department's brochure for honors candidates.

Courses for Nonmajors

For students not majoring in English, the department makes available a variety of courses at all levels. Some courses at the 200 level are open to qualified freshmen, and all of them are open to sophomores. Courses at the 300 level are open to juniors and seniors and to underclass students with permission of the instructor. The suitability of courses at the 400 level for nonmajors will vary from topic to topic, and permission of the instructor is required.

Freshman Writing Seminars

As part of the Freshman Writing Program, the Department of English offers many one-semester courses concerned with various forms of writing (narrative, biographical, expository), with the study of specific areas in English and American literature, and with the relation of literature to culture. Students may elect any two of these courses during their first year to satisfy the Freshman Seminar requirement. Descriptions of Freshman Writing Program offerings may be found in the Freshman Writing Program listings, available from college registrars in August for the fall term and in November for the spring term.

Especially well-qualified students who are considering a major in English are encouraged to enroll in English 270, 271, or 272. Students who have scored 4 or 5 on the Princeton exam or 700 or better on the English Composition or CEEB test or 6 or 7 on the International Baccalaurate (IB) Higher Level Examination are eligible to enroll in the fall semester (space permitting) in any one of these courses. English 270, 271, and 272 will be open to all freshmen in the spring semester who have satisfactorily completed one freshman seminar. Registration is handled by the Freshman Writing Program during freshman registration.
ENGL 270 The Reading of Fiction
Fall, spring, each summer. 3 credits. Each section limited to 17 students. Freshman Seminar. Recommended for prospective majors in English. Forms of modern fiction, with emphasis on the short story and novel. Critical study of works by English, American, and Continental writers from 1880 to the present.

ENGL 271 The Reading of Poetry
Fall, spring. 3 credits. Each section limited to 17 students. Freshman Seminar. Recommended for prospective majors in English. Designed to sharpen the student's ability to understand and respond to poetry, through readings in the major periods, modes, and genres of poetry written in English.

ENGL 272 Introduction to Drama
Fall, spring. 3 credits. Each section limited to 17 students. Freshman Seminar. Recommended for prospective majors in English. Selected works by such playwrights as Sophocles, Shakespeare, Ibsen, and Brecht introduce the chief idioms and styles of drama. The course work may include a special project related to the plays being produced by the Department of Theatre Arts.

Courses Primarily for Nonmajors
ENGL 205 Readings in English and American Literature
Spring. 3 credits. R. Farrell. English Literature to 1800: This course is intended for nonmajors, and is open to any student interested in literature and culture. Authors covered include Chaucer, Shakespeare, Jensen, Swift, and Pope. There will be a take-home midterm and final, both open book. Students will be strongly encouraged to follow their own interests.

ENGL 206 Readings in English and American Literature

ENGL 227 Shakespeare #
Fall. 3 credits. Limited to 25 students. C. Levy. A critical study of representative plays from the principal periods of Shakespeare's career.

ENGL 288-289 Expository Writing
288, fall; 289, spring. 3 credits each term. Each section limited to 16 students. Prerequisites: Students must have completed the freshman writing requirements of their individual colleges before they may enroll in this course. English 288-89 offers guidance and an audience for students who wish to gain skill in expository writing. Each section provides a context for writing defined by a form or use of exposition, a disciplinary area, a practice, or a topic intimately related to the written medium. Course members will read regularly in relevant published material and do a substantial amount of new writing of their own each week, while reviewing and responding to each other's work. Since these seminar-sized courses depend on members' full participation, regular attendance and submission of written work are required. Students and instructors will confer individually throughout the term.

Fall 1995:
Section 1.—Artworks in Controversy—B. Barr
Section 2.—Rhetorics of Community—C. Carlson
Section 3.—What's Yours Is Mine: Cultural Appropriations—P. Coviello
Section 4.—The Reflective Essay—A. Boehm
Section 5.—Understanding the Media—D. A. Williams
Section 6.—Rights, Politics, and the Constitution—L. Laufenberg
Section 7.—Issues and Audiences—B. LeGendre
Section 8.—Writing in the Humanities—S. Davis
Section 9.—Nature in History, Humans in Nature—D. Takacs

Spring 1996: To be announced.
See English Department Guide to Course Scheduling for full fall and spring section descriptions.

Creative Writing
Students usually begin their work in Creative Writing with English 280 or 281, and only after completion of the Freshman Seminar requirement. Please note that either English 280 or English 281 is the recommended prerequisite for 300-level creative writing courses. English 280 and 281 may satisfy a distribution requirement in your college (please check with your college adviser). English 382-383, 384-385, and 480-481 are approved for the English major.

ENGL 280-281 Creative Writing
Fall, spring, summer, and winter session. 3 credits. Prerequisites: completion of the Freshman Seminar requirement. Limited to 18 students. An introductory course in the theory, the practice, and the reading of prose, poetry, and allied forms. Students are given the opportunity to try both prose and verse writing and may specialize in one or the other. Many of the class meetings are conducted as workshops. English 280 is not a prerequisite for English 281.

ENGL 382-383 Narrative Writing
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

ENGL 384-385 Verse Writing
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

ENGL 480-481 Seminar in Writing
See complete course description in section headed Courses for Advanced Undergraduates.

Expository Writing
ENGL 381 Reading as Writing
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

[ENGL 386 Philosphic Fictions
Not offered 1995-96.]

ENGL 387 Autobiography: Memoir, Memory, and History
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

ENGL 388-389 The Art of the Essay
See complete course description in section headed Courses for Sophomores, Juniors, and Seniors.

200-Level Courses Approved for the Major
Students may take up to four of the following 200-level courses for credit toward the English major. Although courses numbered in the 200s are primarily for sophomores, some of them are open to qualified freshmen.

ENGL 201-202 The English Literary Tradition #
201: Fall. 4 credits. W. Wetherbee. Open to undergraduates who have completed the freshman writing requirement. English 201 is not a prerequisite for 202. 201 may be used as one of the three courses before 1800 required of English majors. Interpretation of major works ranging from Beowulf through Milton. Surveys Old English poetry, Chaucer, medieval romances, Spenser, Shakespeare, Renaissance lyric poetry, and Milton. The course will be conducted by a combination of lectures and seminars.

202: Spring. 4 credits. F. Bogel. A survey of English literature from the Restoration through the twentieth century, including works by Dryden, Swift, Pope, Mary Wortley Montagu; the Romantic and Victorian poets; Wilde, Yeats and T. S. Eliot. Lectures and discussion sections.

[ENGL 203 Major Poets
3 credits. Not offered 1995-96.]

ENGL 207 Introduction to Twentieth-Century Poetry
Spring. 3 credits. R. Gilbert and D. Fried. Poetry written in the twentieth century is both challenging and exhilarating in its freedom, innovation, and diversity. Not a survey, this course will sample the vast array of poetic modes and forms employed over the past 95 years, with an emphasis on British, American, and Anglophonic poetry, but with some attention to important works in other languages as well. Our focus in the course will be on the poems themselves—how they feel, sound, look, mean, and work—and on the varying contexts in which they may be read. These contexts include: audiences for poetry, the life and career of the poet; important poetic movements (Imagism, Surrealism, "Language" poetry); verse forms ranging from the strictly patterned to the seemingly random; the poetry industry (or "Po Biz"); poetry and social movements (feminism, multiculturalism); poetry and technology; poetry and science; poetry and the self. Attention will be paid to the craft of poetry-writing through exercises as well as lectures by poets. Poems not in English will be read in translation. No previous study of poetry required.

ENGL 212 An Introduction to Medieval Epic
Spring. 3 credits. This course may be used as one of the three courses before 1800 required for the English major. T. Hill.
An introduction to medieval epic focusing particularly on the English and “insular” epic tradition. Works studied will normally include Beowulf, Maldon, Egils saga, Njals saga, and Tain Bo Cuailgne, the Chanson de Roland, the Nibelunglied, selections from Malory, and English and Scots ballads. Requirements include two papers, a midterm and a final. No previous knowledge of medieval literature is expected.

ENGL 240 Introduction to U.S. Latina/o Literature (also HASP 240 and SPANL 242)
Fall. 3 credits. B. Olguin.
This survey course traces Mexican, American and Mexican American representations of Chicanas and Chicanos from the early 1900s to the present. Students will consider how technology and culture are deployed by Raza Filmmakers to confront mainstream aesthetics in their own articulation of community and ideology through film. The films examined include: Virna Zapata: Bordertown, A Medal for Benny, Tortilla Flat, as well as I Am Joaquín, Señor Chico, The Ballad of Gregoria Cortez, Raices de Sangre, Alambrista, Zoot Suit, La Bamba, Chicana, American Me, Bound by Honor, Mi Vida Loca, and others. Lab fee required.

ENGL 243 Poetry and Politics in the Americas (also HASP 243 and SPANL 243)
Spring. 4 credits. B. V. Olguin.
This course examines poetry and poetics as dialogical statements where history, politics and culture are actively engaged by the poet and the poem. Our particular focus will be on poetic interventions in popular struggles throughout the Americas over time—from nineteenth-century independence movements to twentieth-century nationalist and internationalist struggles—and across space—from the Caribbean, South, Central, and North America. Students will consider the unique challenges to aesthetics, ideology and identity in general and the engaged artists such as Jose Martí, Nicarao Parra, Ariel Dorfman, Pablo Neruda, Nicolás Guillén, Claribel Alegría, Roque Dalton, Raúl Salinas, Lorna Dee Cervantes, Carolyn Forché, Alejandro Magnani, Sonia Sánchez, Allen Ginsberg, Martín Espada, Gwendolyn Brooks, Adrienne Rich, and others.

ENGL 251 Twentieth-Century Women Novelist(s) (also Women’s Studies 251a)
Fall. 4 credits. Not offered 1995-96.

ENGL 260 Introduction to American Indian Literature
Fall. 3 credits. D. Moore.
In an introduction to Native American literatures, we read a variety of genres—novels, short fiction, autobiography, poetry, oral traditions—spanning Indian publications through the last two centuries. Issues arising from the texts include aesthetics of orality and literacy, cultural change and survival; colonial identity politics; mythic histories, world views and ideologies; and contemporary tribal sovereignty. A goal of the course is to read historical American contexts through the eyes of Native American texts.

ENGL 262 Asian American Literature (also Asian American Studies 262 and American Studies 262)
Fall. 3 credits. S. Wong.
This course will introduce students to the wide range of writing by Asian Americans and to some critical issues concerning the production and the reception of Asian American texts. In reading through selected works of prose, poetry, and drama, we will be asking questions about the historical formation of Asian American identities and the problems of defining an Asian American literary tradition.

ENGL 263 Studies in Film Analysis
Fall and spring. 4 credits. Enrollment limited to 20 students. Preference given to English majors. L. Bogel.
Fall: Special topic: Interpreting/ Hitchcock.
Through detailed analysis of about fifteen of Hitchcock’s major films—from British silents such as The Lodger and the British talkies of the 30s (The Thirty-Nine Steps) to the early 40s work in Hollywood (Spellbound, Notorious), and major American films of his later period (North by Northwest) —we will consider Hitchcock as a major technical and stylistic innovator in the history of cinema. As texts for psychoanalytic and feminist approaches to study, his films invite questions about film language, the ethics of spectatorship, and the nature of desire and sexuality. Frequent short essays and viewing exercises encourage students to engage through their writing the course’s critical concerns. Students must be free to attend regular evening screenings and video showings of the films once or twice a week. Lab fee.

ENGL 264 Interpreting Melodrama and the Women’s Film of the 30s and 40s
Spring. Special topic: Interpreting Melodrama and the Women’s Film of the 30s and 40s. With some attention to melodrama’s roots in nineteenth-century fiction and theatre and in the antebellum establishment of the century through selected novels, poems, and plays, films, journalism, and historical works. The course addresses these and other questions about that turbulent decade through a reading of novels, poems, plays, films, journalism, and historical works. Through these, we will be attentive to whether the 1960s have been converted into nostalgia and otherwise revised by the media. Texts will include Catch 22, The Autobiography of Lincoln X, The Armies of the Night, and The Electric Kool-Aid Acid Test as well as films, music, speeches, and manifestoes.

ENGL 296 Topics in American Indian Literatures
The course is an interdisciplinary exploration of the literature, history, and politics of various indigenous American cultures and their conceptual universes. Questions range from comparative studies of land-based versus transcendental religions to issues of cultural appropriation, economic development, tribal sovereignty, and other contemporary contexts of Native American literature.

ENGL 274 Scottish Literature and Culture
Spring. 4 credits. Enrollment limited to 20 students. This course may be counted as one of the three pre-1800 literature courses required of English majors, but nonmajors are welcome. H. Shaw and T. Hill.
Scotland was an independent kingdom during most of its history. Although it is now politically united with England, it preserves its cultural distinctiveness. This course provides an introduction to Scottish literature and its cultural context. We will focus on important Scottish literary texts, with special emphasis on the medieval period and the eighteenth and nineteenth centuries. In addition, we will provide something of an introduction to Scottish history and to nonliterary expressions of Scottish culture (such as music and painting). The course should appeal to those who wish to learn more about their Scottish heritage, to those who wish to view in a new light a perspective normally considered foreign. We will begin with a look at early paradigms for performativity. We will read fiction by Leontine Sagan, Sheila Monique Wittig, Alice Walker, Cherrie Moraga, Sigmund Freud, Nella Larsen, Adrienne Rich, and Jewelle Gomez, as well as films by Leontine Sagan, Hume Burns, Scott, Hogg, Stevenson, and Grassic Gibbon.

ENGL 275 The American Literary Tradition (also American Studies 275) Fall; spring 3 credits. Recommended for prospective majors in American Studies. This is not a Freshman Seminar. Fall: B. Maxwell; spring: M. Seltzer. The problem of an American national literature is explored through the reading, discussion, and close analysis of texts across the range of American literary history. Not a survey, this course focuses on the relations of the texts to each other, the shaping of national identities in those relationships, and the assumptions about history, language, and the self that underlie them.

ENGL 277 Folklore and Literature Fall. 4 credits. A. Lurie. An introduction to British and American folklore: folk speech and slang, rhymes, riddles, jokes, ballads, songs, legends, fairy tales, ghost stories, and customs and festivals; plus reading in British and American poetry and fiction that uses these forms and themes. Students will also learn how to collect and analyze contemporary folklore.

ENGL 279 Lesbian Personae (also Women's Studies 279) Fall. 4 credits. E. Hanson. This course will offer a survey of literature and films by or about lesbians. We will examine how lesbian desire and identity are historically constructed through narrative. What does it mean to read as a lesbian? What are the various tropes and personae through which lesbian desire has been articulated? What has been the relationship of lesbianism to feminism? How is lesbian identity inflected by homophobia, sexism, and racism? We will begin with a look at early paradigms for lesbian desire such as romantic friendship and sexual inversion, then move on to an extensive examination of lesbian feminism, and close with a discussion of desire and performativity. We will read fiction by Gertrude Stein, Radclyffe Hall, Havelock Ellis, Sigmund Freud, Nella Larsen, Adrienne Rich, Monique Wittig, Alice Walker, Cherrie Moraga, Jeanette Winterson, and Jewelle Gomez as well as films by Leontine Sagan, Sheila McLaughlin, Monica Triet, Ingrid Bergman, and Rainer Werner Fassbinder. Students are required to attend a weekly film screening in addition to seminars.

ENGL 285 Art, Archaeology, and Analysis (also Engineering 185, MSAE 285, Physics 200, Archaeology 285, Art 372 and NS&E 285) 3 credits. See ENGRG 185 for description.

ENGL 291 American 1920s: Literature and Culture (also American Studies 291) Spring. 3 credits. B. Maxwell. This course will take a broad approach to the cultural activities of the decade that followed the First World War and preceded the Great Depression. Topics will include the new motives, forms, and audiences of fiction and poetry; literary realism under duress; the Harlem Renaissance; the flowering of jazz and blues; and the rise of postwar blues and the influenza epidemic; expatriation; suffragist politics and the New Woman; Fugitive research; the masses as a matter for intelligent scrutiny; Fordism; the business models of DuSable, Sacco and Vanzetti, the Red Scare, and the fear of anarchy; marketplace phantasмагoria; the cultures of radio, children's books, popular song and jazz. Readings: Randolph Bourne; Thurgood Marshall; W. E. B. DuBois; Floyd Dell; Lewis Mumford; Gertrude Stein; Walter Lippmann; Max Eastman; W. C. Williams (In the American Grains). Fiction: Jean Toomer (Cane); Ernest Hemingway; F. Scott Fitzgerald; Sherwood Anderson; John Dos Passos; Josephine Herbst; Samuel Orkiss (Hauch, Paumb and Jouh); Sinclair Lewis (Babbitt). Poetry: W. C. Williams; Pound; Eliot; Hart Crane; Marianne Moore; H. D.; Louis Zukofsky; Langston Hughes.

ENGL 295 The Essay in English # Spring. 4 credits. Prerequisite: completion of freshman composition requirement. This course may be counted as one of the three pre-1800 literature courses required of English majors. L. Fukandiny. What is an essay and what is it for? How does it work as prose discourse, as a text of the self? Impelled by such generic questions and others raised by Montaigne's French Essais (1588), this course explores the invention of the essay in English during the sixteenth and seventeenth centuries. Reading in periodicals and magazines of the eighteenth and nineteenth centuries. Readings include selections from the work of Bacon, Cornwallis, Donne, Earle, Cowley, Temple, Swift, Addison, Steele, Johnson, Franklin, Goldsmith, Lamb, Hazlitt, Irving, and DeQuincey. Essays by earlier writers are matched rhythmically and/or thematically with readings from more recent practitioners of the genre including Dubros, Woolf, Orwell, Welty, Baldwin, Selzer, Ozick, Achebe, Didion, S. Naipaul, Dillard, Sanders, and others. This is a course for students interested in reading essays and in thinking about how this nonfiction prose genre developed and how it works. No special background in literary history is assumed.

Courses for Sophomores, Juniors, and Seniors

Courses at the 300 level are open to sophomores, juniors, and seniors only with the permission of the instructor.

ENGL 301 Mind and Memory: Explorations of Creativity in the Arts and Sciences (also Theatre Arts 301 and Music 372) Spring. 4 credits. J. McConkey. Creativity is the attribute of the mind that enables us to make sense of the world, to seek new, often-familiar information, to perceive analogies and other linkages in seemingly unlike elements, to seek for syntheses. As is true of all learning, creativity is dependent upon memory—a memory that is genetic and social as well as personal and experiential. This course will explore the nature of creativity in science and art, indicating the differing requirements for discovery in the disparate disciplines while demonstrating the commonality that underlies the creative process and binds (say) physicist or mathematician to poet, composer, visual artist. The opening sessions will be concerned with the crucial role of memory in learning, discovery, and spiritual insight for all humans, and will make reference to experimental research into the complex nature of the human brain, including its intimate connections with the rest of the body. Following this introduction, the course will rely on weekly guest speakers from such disciplines in the arts and sciences as possible, faculty members who will discuss (for interested undergraduates, whatever field they may be preparing to enter) the process underlying their research, or their work as creative or performing artists. The guests will be asked to speak of their goals, the problems they have faced, and what they have learned from their disappointments as well as their achievements.

Members of the course are encouraged to enroll in another course or engage in an activity (research or artistic production or performance) in which the insights gained in this class can be applied or tested. To further abet the active participation so necessary to learning, students will be asked to keep a journal, one that summarizes their understanding of, and response to, each presentation by a guest lecturer—a journal that will serve as a continuing record of their experiences as members of the course, and that will become the primary resource for their final paper, which will be submitted at the semester's end, that will give their carefully considered assessment of the applicability of what they have learned in this course to that second course or activity, to their own mental processes, and to the future they propose for themselves.

[ENGL 302 Literature and Theory (also English 702 and Comparative Literature 302 and 702) 4 credits. Not offered 1995-96.]

[ENGL 308 Icelandic Family Sagas # 4 credits. Limited to 30 students. Not offered 1995-96.]

ENGL 310 Old English Literature in Translation # Fall. 4 credits. This course may be used as one of the three courses before 1800 required for the English major. T. Hill. Cultural backgrounds, reading, and critical analysis of Anglo-Saxon poetry in translation, pagan and Christian epic, elegy, heroic legend, and other forms. Attention will be given to the relations of this literature to that of later periods.
irony, and mock-forms; the languages of the Middle English is neither expected nor required. Course participants will be encouraged to follow up on their own interests in class reports and papers.

[ENGL 320 The Sixteenth Century—Tudor Culture] Fall. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. Not offered 1995–96.

[ENGL 321 Spenser and Malory] Spring. 4 credits. Limited to 45 students. This course may be counted as one of the three pre-1800 literature courses required of English majors, but nonmajors are welcome. C. Kaske. Paired selections covering half of Malory's *Morte d'Arthur* and half of Spenser's *Faerie Queene*. Chretien's romances, Sir Galahad and the Green Knight, and some of Spenser's minor poems will be mentioned occasionally as background. Comparisons will assess possible literary influence, the distinctive genius of each author as a writer of romance, and the development of Arthurian romance from the Middle Ages to the Renaissance. Informal lecture and discussion. Two papers, no exams.


[ENGL 325 The Culture of the Renaissance II (also Comparative Literature 362, and History 364)] 4 credits. Not offered 1995–96.

[ENGL 327 Shakespeare] Spring. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. C. Levy. A survey of representative Shakespearean drama designed to illustrate the range of the playwright's artistic achievement.

[ENGL 329 Milton] Fall. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. G. Teskey. An introduction to the life, poetry, and thought of John Milton.

[ENGL 330 Restoration and Eighteenth-Century Literature] Fall. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. F. Bogel. Close reading of texts in a variety of genres (poetry, fiction, autobiography) will be guided by such topics as the nature of satire, irony, and mock-forms; the languages of the ridiculous and the sublime; the authority and fallibility of human knowledge; connections among melancholy, madness, and imagination. Works by such writers as Rochester, Dryden, Swift, Gay, Defoe, Johnson, Boswell, Sterne, and Cowper.


[ENGL 337 Contemporary American Drama] Fall. 4 credits. R. Parker. Readings in various writers from the late 1780s through the 1820s—among them Blake, Burke, Wordsworth, Wollstonecraft, Coleridge, Byron, Mary Shelley, Percy Shelley, and Keats—with major emphasis on poetry but substantial collateral attention also to prose fiction, drama, letters, and criticism. The course will focus as much with formal experiments in narrative, lyric, and dramatic representation as with political and cultural contexts in an age of national reform and international revolution.

[ENGL 345 The Victorian Period] Fall. 4 credits. P. Sawyer. The Victorian period was a time of turbulence and creativity, like our own, when people sought to re-think basic questions through a flourishing literature. Our readings will focus on developing Victorian ideas of gender and art. Can aesthetic experience in some sense replace older notions of religion, pleasure, and morality? What is the place of "feminine" art in a "masculine" world? What are the meanings of "feminine" and "masculine"? What are the possibilities for a woman living in a man's world? Readings will include the poetry of Tennyson, Browning, and Hopkins; prose by Ruskin, Arnold and Pater; and three novels: *Great Expectations*, *The Mill on the Floss*, and *The Picture of Dorian Gray*.

[ENGL 346 Freud: Optional Clinical Discussion Section (also Comparative Literature 351, German Studies 351, Psychology 391)] 1 credit. Not offered 1995–96.

[ENGL 347 Reading Freud: Race, Gender, and Psychoanalysis (also Comparative Literature 347, German Studies 347, and Psychology 389)] 3 credits. Not offered 1995–96.

[ENGL 348 The Female Literary Tradition (also Women's Studies 348)] Fall. 4 credits. M. Jacobus. We will read and around a "female literary tradition" that has been constituted retrospectively by contemporary feminist literary criticism—books by and about women that speak to each other, revise or rethink each other, or take their place in an evolving continuum of "feminist," "feminine," or "feminist" concerns at different historical moments. Using a reader of contemporary feminist criticism drawn from a wide range of approaches, we will focus on clusters of fiction by women: Romantic female gothic (Wollstonecraft, Radcliffe, Austen, Mary Shelley); women's responses to Victorian social and political upheaval (Bronê, Gaskell, Barnett Browning, Eliot); the fin de siècle "daughters of decadence" (Schreiner, Chopin, Gilman, and Egerton); and early feminist modernists and sexual dissidents (Woolf, H. D., Radclyffe Hall, and Nella Larsen). The emphasis will be on class discussion and student presentations, and on debating the validity (or otherwise) of differing feminist approaches to literature.


[ENGL 354 The British Modernist Novel] Fall. 4 credits. M. Hite. "...in or about December 1910," Virginia Woolf wrote, "human character changed." The change may have been neither as sudden nor as drastic as Woolf (with her tongue firmly in her cheek) claimed, but British novelists writing in what we now call the so-called 'period—roughly, between Woolf's Georgian starting point and the beginning of World War II—did seem convinced that their culture was markedly different from the Victorian and Edwardian cultures of their predecessors and that this difference affected both "human character" and the kind of writing that could best represent such altered concepts of humanity. This course will examine a number of works that illustrate the range and diversity of the British modernist novel. Writers include E. M. Forster, Woolf, James Joyce, Dorothy Richardson, Jean Rhys, and D. H. Lawrence.

[ENGL 355 Decadence (also Women's Studies 355)] Spring. 4 credits. E. Hanson. "My existence is a scandal," Oscar Wilde once wrote, summing up in an epigram the effect of his carefully cultivated style of perversity and paradox. Through their valorization of aestheticism and all that was considered artificial, unnatural, or morbid, the so-called "decadent" writers of the late-nineteenth century sought to free the pleasures of beauty and sexual desire from their more conventional ethical moorings. Although we will focus on Oscar Wilde, we will also read works by Charles Baudelaire, Paul Verlaine, J. K. Huysmans, Renée Vivien, Leopold von Sacher-Masoch, Walter Pater, A. C. Swinburne, and Lionel Johnson, as well as a few later writers such as Ronald Firbank and Djuna Barnes. We will also consider historical, theoretical, and early medical texts on sexuality. Because this is a course in lesbian and gay studies, we will focus primarily on the various ways that decadence became a powerful trope for the articulation of homosexuality and other proscribed sexual pleasures. Topics for discussion will include homophobia and sexual encoding, androgyny and sexual inversion, sodomy and satanism, lesbianism and vampirism, cultural and linguistic degeneration, hysteria and paranoia, masochism and mysticism, chastity and sublimation, Catholicism and Hellenism, and dandyism and camp.


ENGL 361 Early American Literature (also American Studies 361) #
Spring. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. S. Samuels.
American writing from the 1630s to the 1830s, including prose and poetry of the Puritans, Edwards, Franklin, Crevecoeur, Jefferson, Cooper, and the early work of Poe, Hawthorne, and Emerson.

[ENGL 362 The American Renaissance (also American Studies 362) #]

ENGL 363 The Age of Realism and Naturalism
Fall. 4 credits. M. Seltzer.
The literary expression of new attitudes toward American society and culture between the Civil War and the First World War. We will read a sequence of representative instances, chiefly fictional or historical, selected from the work of such authors as William Dean Howells, Harold Frederic, and such major works as Hawthorne's The Blithedale Romance, Melville's Moby Dick, Twain's Adventures of Huckleberry Finn, and Crane's The Red Badge of Courage. Time permitting, other authors to be read may include Breckinridge Brown, Rebecca Nurse, James Fenimore Cooper, Harriet Beecher Stowe, and James A. Garfield.

[ENGL 365 American Literature since 1945]
Spring. 4 credits. Not offered 1995-96.

ENGL 366 The Nineteenth-Century American Novel (also American Studies 366) #
Fall. 4 credits. Enrollment limited to 65 students. S. Samuels.
A study of the broad range of American fiction in its first flowering, this course will include such major works as Hawthorne's The Scarlet Letter, Melville's Moby-Dick, Stowe's Uncle Tom's Cabin, James's The Portrait of a Lady, Twain's Adventures of Huckleberry Finn, and Crane's The Red Badge of Courage. Time permitting, other authors to be read may include Breckinridge Brown, Rebecca Nurse, James Fenimore Cooper, Harriet Beecher Stowe, William Dean Howells, Harold Frederic, and Kate Chopin.

[ENGL 367 The Modern American Novel (up to WW II)]

[ENGL 370 The Nineteenth-Century English Novel #]

ENGL 371 American Poetry to 1950

ENGL 372 English Drama to 1700 (also Theatre Arts 372) #
Fall. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. S. McMillen.
Major plays and other events in the English theatre, from the medieval craft cycles through the age of Shakespeare and Restoration period. Writers include Marlowe, Kyd, Shakespeare, Dekker, Jonson, Middleton, Webster, Etherege and Wycherley.

[ENGL 373 English Drama from 1700 to the Present (also Theatre Arts 373) #]

ENGL 374 Nineteenth-Century American Women Writers (also Women's Studies 374 and American Studies 374) #
Fall. 4 credits. Lois Brown.
In this cross-cultural examination of nineteenth-century American women writers, we will contrast a variety of nineteenth-century themes of fiction, poetry, and nonfictional prose, and slave narratives. We will investigate the ways in which these writers used their texts to construct culturally valuable and authentic selves. We will also consider tensions between traditional ideas of womanhood and political pragmatism, passionless femininity and expressed sexuality, restrictive domesticity and dangerous but vital autonomy. Readings will include works by authors such as Louisa May Alcott, Kate Chopin, Fanny Fern, Emma Dunham-Kelley, Frances Harper, E. D. E. N. Southworth, Harriet Beecher Stowe, and Harriet Wilson.

ENGL 381 Reading as Writing
Fall. 4 credits. Course limited to 15 students. Prerequisite: permission of the instructor on the basis of a writing sample (critical/interpretive prose), which should demonstrate the writer's ability to read critically and write constructively about the work of other writers; it aims for a portfolio of nonfiction prose that is conceptually rich and stylistically polished.

[ENGL 382-383 Narrative Writing]
Fall, spring. 382, spring. 383. 4 credits each term. Each section limited to 15 students. Prerequisite: permission of instructor on the basis of one or more pieces of recent writing (prose) submitted before the beginning of term, preferably at pre-registration time.

ENGL 384-385 Verse Writing
Fall or summer, 384; spring, 385. 4 credits each term. Each section limited to 15 students. Prerequisites: English 280 or 281 and permission of instructor.

ENGL 386 Philosophic Fictions

ENGL 387 Autobiography: Memoir, Memory and History
Spring. 4 credits. L. Fakundiny.
Central to this course is the question: how does the life constructed in memoir, through the personal activity of "remembering," assimilate and position the "public," or cultural, context of that life? How, in other words, does history inhabit memory and how does memory personalize history? How aware is the constructed self (the life that is being remembered) of its historical moment, and to what ends is the self historicized in a given memorialist text?

ENGL 388-389 The Art of the Essay
4 credits. Limited to 15 students. Prerequisite: permission of instructor on the basis of one or more pieces of recent writing (prose) submitted before the beginning of term, preferably at pre-registration time.

ENGL 398: Fall. 388; spring. 389. 4 credits each term. Each section limited to 15 students. Prerequisite: permission of instructor on the basis of one or more pieces of recent writing (prose) submitted before the beginning of term, preferably at pre-registration time.

ENGL 399: Fall or summer. 398; spring, 399. 4 credits each term. Each section limited to 15 students. Prerequisites: English 280 or 281 and permission of instructor.
English 288–289 or 286, and who desire intensive practice in writing essays. Particular, but not exclusive, emphasis on expository techniques or analysis and persuasion. Interested students should submit writing samples to the instructor before the beginning of term—preferably during course scheduling.

ENGL 395 Video: Art, Theory, Politics (also Theatre Arts 395)
Fall. 4 credits. T. Murray.
The course will offer an overview of video art and alternative documentary video (which often incorporates styles of "video art") over roughly the past twenty-five years. It will analyze three historical phases of video:
1) the development of video from its earliest turn away from television, 2) video's relation to performance art and installation, 3) video's return to television through cable and its incorporation in film through experiments in technology. Screenings will include early political and feminist video, (from Ant Farm, Chip Lord, Mariko Mori, Rosler, Joan Jonas, Lynn Hirschman, and Paper Tiger TV, etc.), conceptual video of the 80's and 90's (Woody Vasulka, Thierry Kuntzel, Mary, Lucier, Bill Viola, Gary Hill, Steve Fagan, etc.), and gay and multicultural video of the 90's (Munadas, Juan Downey, the Yonemotos, Jerry Tartaglia, Gregg Bordowitz, Richard Pung, Pratibha Parmar, Marlon Riggs, etc.). Secondary theoretical readings on postmodernism, video theory, mutism, virtualization, and documentary will provide students with a cultural and political context for the discussion of video style, dissemination, and reception. Lab fee.

Courses for Advanced Undergraduates
Enrollment in courses at the 400 level is generally limited by prerequisite or permission of the instructor.

[ENGL 402 Literature as Moral Inquiry]

ENGL 403 Studies in American Poetry
Drawing on recent anthologies as well as individual volumes that have had a significant impact (e.g., Ginsberg's Howl, Lowell's Life Studies, Plath's The Bell Jar, Ashbery's Self-Portrait in a Convex Mirror, Dove's Thomas and Beulah), we'll follow the development of American poetry from World War II to the present. Four five-page papers, one or two short presentations.

[ENGL 404 History into Fiction: Nazis and the Literary Imagination (also Comparative Literature 404, and German Studies 414)]

ENGL 405 The Politics of Contemporary Criticism
Fall. 4 credits. Limited to 15 students. Open only to undergraduates. Prerequisites: permission of instructor; background in literary studies will be expected, but no training in critical theory will be presumed. S. Mohanty.
An introduction to some of the major issues in contemporary criticism through an examination of the relationship between two influential movements in critical theory—hermeneutics and deconstruction. Adherents of both movements seem to agree about the fundamental opposition between their respective approaches and conclusions. We shall try to understand the issues at stake in this opposition, exploring such questions as: What is a (literary) text? What is interpretation and what are its limits? What political issues underlie particular critical strategies and methodological choices? We shall negotiate between the two, emphasizing each position and focus on the implications of answers to such questions in actual critical analysis. Primary readings from some of the chief exponents of the two movements, particularly Paul Ricoeur, Hans-Georg Gadamer, and Jacques Derrida. Additional readings, from a variety of critical and philosophical traditions, including such authors as Rorty, Eagleton, Felman, Foucault, and Jameson.

ENGL 406 The Subject Possessed (also ENGL 606)
For description, see S HUM 408.

[ENGL 408 Poetry of the 1990s]

ENGL 409 Disillusion and Disappearance (also ENGL 609 & COM L 609)
For description, see Society for Humanities 409.

ENGL 411 Introduction to Old English (also ENGL 611)
Fall. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. A. Galloway.
Why take "Old-Anglish"? A reason for anyone to consider a course in the earliest extant English literature and language is that it will expand your scope in considering later forms of the English language and subsequent literary genres. Old English elegies, for instance—the complaints of solitary, history-burdened men and women—are important parts of the entire tradition of lyric poetry, dream poetry in English also begins here, so does English epic and mini-epic.
Especially in the first few weeks we will attend primarily to the language; from the beginning, however, cultural and literary issues will be brought to bear on the details of language, rhetoric, narrative form, and thematic concerns. We will spend the balance of the course translating and discussing poetry and prose. No prerequisites; daily translation, a midterm, a final, and a short paper are required.

ENGL 412 Beowulf (also ENGL 612)
Spring. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. R. Farrell.
A close reading of Beowulf. Attention will be given to relevant literary, cultural, and linguistic issues. One semester's study, or the equivalent, of Old English is a prerequisite.

ENGL 413 Middle English (also ENGL 613)
Fall. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. T. Hill.
This course surveys the literature of late medieval England, beginning with the cultural, literary, and linguistic collapse of standard Old English and proceeding to the age of Chaucer and perhaps a bit beyond. Readings will move through chronicles, homilies, lyrics, and acknowledged literary masterpieces such as The Owl and the Nightingale, the works of the Pearl poet, selections from Piers Plowman, and other poems from the "alliterative revival."

ENGL 414 Print and 18th-Century Literary Culture (also ENGL 616 and Society for Humanities 418)
For description, see S HUM 418.

ENGL 418 Literature and Institutions, 1350–1500 (also ENGL 618)
Spring. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. A. Galloway.
This seminar will move through a series of topics or events and texts in the 14th and 15th centuries in England, exploring the relations in this period between what may loosely be called "institutions" and also somewhat loosely "literature." The topics and events will include Edward III's French wars, Richard II's tyranny and deposition, the spread and outlawing of Lollardy, the Rising of 1381, the "inauguration of learning" and the canonization of Henry V, and the struggles between the royal houses of Lancaster and York. The texts will include political occasional poetry, chronicles, some of Chaucer's Canterbury Tales, Langland's Piers Plowman, selected plays by Shakespeare, and Lydgate, Margery Kempe's "autobiography," Lollard writings and depositions, and some "morality" drama. We shall aim to approach the texts not simply in the immediate context of events but also in the deeper context of their presentation of and relationship to more abiding social structures: "institutions" in the sense of traditional and more recent organizations and collectivities of late-medieval life. No particular background is required except for exposure to Middle English or a willingness to spend a bit of extra time becoming familiar with this not very foreign foreign language.

ENGL 419 Suppressing Laughter in London and Dublin, C. 1680–1900 (also ENGL 619 and Society for Humanities 419)
For description, see S HUM 419.

[ENGL 421 Spenser (also English 620)]

ENGL 423 Seventeenth-Century Lyric
Spring. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. B. Correll.
A study of representative seventeenth-century English poets, both major and minor, male and female, secular and religious. In addition to giving attention to formal aspects of the poetry, we will consider questions of historical context and the poetic speaker. As we shall see in our readings, these seventeenth-century poets are both products, and producers of their culture. We will also study the critical reception of seventeenth-century poetry and its place in contemporary English studies.

Not open to sophomores.

ENGL 427 Shakespeare
Fall and spring. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. B. Correll.
A study of representative seventeenth-century English poets, both major and minor, male and female, secular and religious. In addition to giving attention to formal aspects of the poetry, we will consider questions of historical context and the poetic speaker. As we shall see in our readings, these seventeenth-century poets are both products, and producers of their culture. We will also study the critical reception of seventeenth-century poetry and its place in contemporary English studies.

ENGLISH 379
Night, Merchant of Venice, Measure for Measure, The Taming of the Shrew, Othello, Antony and Cleopatra, Coriolanus, The Sonnets. Discussions will take up such issues as royal politics, market economies, summmary law, anti-theatrical pamphlets, spectacle and performance, psychology and gender, masculine identity, and the situation of women. Students will also be introduced to representative critical approaches and debates (feminist, new historical, queer, post-structuralist, psychoanalytic) and will write a critical research paper. Limited to 20 students.

**Spring:** Shakespeare on Film. T. Murray. We will analyze the transformation of Shakespeare's plays into films. Attention will be focused on the various aspects of film and analysis. First, we will consider carefully the film's interpretation of the text—how does the visual image influence the viewer's perception of the text? Second, we will consider the critical and technical choices made by the filmmakers and actors to portray the interpretation—how does a film ask the viewer to watch it, and what cinematic techniques contribute to the image? These issues will be considered in light of the differences between stage and film representations of the plays. A preliminary syllabus might include Othello (films by Ulkevich and Burge, with Olivier), King Lear (Kozintsev and Brooks), Hamlet (Olivier and Kozintsev), Macbeth (Polanski and Kurosawa, Throne of Blood), and The Tempest (Jasman and Greenaway).

**ENGL 428 Fictions of Change:** Shakespeare, Scott, Stendhal, Achebe
Fall. 4 credits. Limited to 20 students. Nonmajors: H. Shaw. What does change mean to Shakespeare, Scott, Stendhal, Achebe, and to their cultures? This course examines literature that represents periods of historical transition in England, Scotland, France, and Nigeria. What do these works reveal about how the movements of history affect individuals, in the periods they depict and in our own? How does the recognition that we are historical beings alter our sense of the human situation and of moral responsibility? We will focus our energy primarily on reading and discussing individual novels and plays. As time allows and class interest suggests, we may also turn our attention to the source materials the various authors draw upon and to theories, past and present, about history and its relationship to literature.

**ENGL 429 Readings in the New Testament (also NES 429 and Religious Studies 429)** #
For description, see COM L 429.

**ENGL 431 Studies in the Enlightenment #**
Fall. 4 credits. This course may be counted as one of the three pre-1800 literature courses required of English majors. Topic for 1995: Men, Monsters, and Melancholia: Fictions of Enlightenment from Rousseau to Frankenstein. M. Jacobus. What do Rousseau's Nouvelle Héloïse and Mary Shelley's Frankenstein have in common with one another? We will explore the underside of Enlightenment reason through a variety of novellas that speak to the emotions and affects, the monsters and abjects, the dangers and desires that shape fiction in the shadow of Enlightenment optimism. Exploring both sentimental and libertine writing, the gothic novel and travel journal, critiques of patriarchy and nation, political and apocalyptic visions of ruin, the course will also ask questions about gendered subjectivity that trouble the supposedly undifferentiated Enlightenment subject. Works will include Rousseau's Nouvelle Héloïse and Emile, Diderot's Le Neuf, de Sade's Justine, Wolfe's Travels, Radcliffe's The Italian, Lewis's The Monk, Edgeworth's Castle Rackrent, Austen's Mansfield Park, Burney's The Wanderer, and Mary Shelley's Frankenstein, The Last Man, and her incest novel, Matilda.

**ENGL 435 The Victorian and Edwardian Theatre (also Theatre Arts 435)**

**ENGL 437 Fictions of Apartheid and Modes of Liberalism @**

**ENGL 438 Liberties and License (also French Literature 474)** #

**ENGL 439 Austen and the Eighteenth Century #**
Spring. 4 credits. Limited to 20 students. This course may be counted as one of the three pre-1800 literature courses required of English majors, but nonmajors are welcome. H. Shaw. This course will give students the opportunity to read and discuss nearly all of Jane Austen's fiction, as well as works by writers who influenced her. Austen's novels deal deftly on eighteenth-century thought and literature, exploring these links should enrich our experience of Austen's wit and wit. Although this course may be used to fulfill the major requirement of courses before 1800, it is not limited to English majors.

**ENGL 441 The British Romantic Novel**

**ENGL 442 Testimonial Narratives: U.S. Latinos at War (also Hispanic American Studies 442 and Spanish Literature 494)**

**ENGL 445 Nineteenth-Century Women's Fiction (also Women's Studies 445)**
Fall. 4 credits. D. Mermin. Works by Jane Austen, Elizabeth Gaskell, and Charlotte Bronte will be studied with particular attention to the development of a woman's tradition in fiction, women writers' conceptions of themselves and their work, and their social and cultural situation. We will look at letters, diaries, and biographies (including Gaskell's Life of Charlotte Bronte) as well as several novels.

**ENGL 448 The American Short Story**
Spring. 4 credits. R. Morgan. A seminar exploring the range of American short story from the late eighteenth century to the present. This course will also focus on the development of the short story as a genre in the United States. We will consider the origins of the short story as a literary form and explore the evolution of the genre through the work of Hawthorne, Poe, Melville, Twain, James, Welty, and others to twentieth-century examples. We will also consider the larger background of the short story in the work of Boccaccio and later European authors, as well as the impact of history and popular media on the contemporary short story. Students will write both critical papers and works of fiction.

**ENGL 450 The History of the Book**
Spring. 4 credits. Limited to 20 students. Prerequisite: permission of the instructor. D. Eddy.
A study of the physical aspect of books and their production, reading, and distribution during the early modern period. Included are papermaking, typography and printing, bookbinding, and the history of book illustrations; the transmission of texts and bibliographical descriptions of hand-printed and modern book forms. Above all, this is the study of the book as a work of art.

**ENGL 451 Violence, Nation, Myth: The Americas (1770-1940)**
For description, see HIST 470.

**ENGL 454 Theatre and Society**
For description, see THETR 434.

**ENGL 455 The Aesthetics and Their Critics: 1860-1900**
Fall. 4 credits. Limited enrollment. Prerequisite: permission of instructor. S. Siegel.
This seminar will read in, among others, Swinburne, D. Bernhard, James, Morris, Symonds, Pater and Wilde against Froude's, Arnold's, and Lecky's rational politics of "progress" on the one side and, on the other, the lurid fantasies of "decadence," crystallized in the writings of, for example, Mallock, Crackenthorpe, and Harrison. Topics will include the idea of art as such; the preoccupation in London with "progress" and "decadence"; the objectives of the Purity Movement, illegal behavior and its regulation; and the place of the "Celts" in British social thought. Examination will be by individual research, class presentation, and in-class writing.

**ENGL 462 The Scarlet Letter and American Literature #**

**ENGL 469 William Faulkner**

**ENGL 470 Studies in the Novel**
4 credits. Limited to 18 students. Fall: Hawthorne, Melville, and James. Hawthorne, Melville, and James: the major texts. D. McGall; Spring: Joyce's Ulysses. D. Schwarz. A thorough episode-by-episode study of the art and meaning of Joyce's Ulysses. We will place Ulysses in the context of Joyce's canon, Irish culture, and literary modernism. We shall explore the relationship between Ulysses and other experiments in modernism—especially painting and sculpture—and show how Ulysses redefines the concepts of epic, hero, and reader. We shall discuss how Ulysses raises major issues in literary study and tests various critical and scholarly approaches. Such a self-conscious inquiry into theories and methods should prepare students to confront other complex texts. No previous experience with Joyce is required.

**ENGL 471 American Indian Women's Literature**

**ENGL 472 Irish Culture: 1700-1921**

**ENGL 473 Through the Thirties: African American Literature, 1900-1939**
ENGL 474 African American Poetry since 1940

ENGL 475 Studies in the Twentieth Century
Fall. 4 credits. Topic for fall 1995: Gender and War in the Twentieth Century. M. Hite
In the twentieth century, justifications of or oppositions to war are often represented in highly gendered language, with whole nations coded as masculine or feminine (or some indeterminate region between the two poles) depending on their attitude toward aggression. In addition, the situation of war can sharpen or fuzz existing gender boundaries applied to individuals, for instance requiring revised definitions of femininity when women enter the workplace in large numbers or creating new distinctions between "real" and "effeminate" men based on willingness to fight.

This seminar will examine diplomatic, journalistic, theoretical and imaginative writing, as well as political cartoons and films, dealing with three major wars in the twentieth century: World War I, World War II and the Vietnam War—the last in its encircling Cold War context. Students will lead one class discussion and write two 10-12 page papers.

ENGL 476 The Tonies: Morrison and Bambara—African American Women Writers
Fall. 4 credits. H. Spillers.
The 1970s witnessed a veritable explosion of African-American women's writing in the United States. Two of the most significant figures of this movement include Toni Morrison and Toni Cade Bambara. With the 1969 publication of The Bluest Eye, Morrison's career as a prolific American novelist was launched, culminating in the writer's Beloved (1987) and Jazz (1992); in 1980, after publishing a couple of volumes of short stories—The Sea Birds Are Still Alive and Gorilla, My Love—Toni Cade Bambara brought out her first novel, The Saltaters, which remains one of the most technically challenging and innovative works among African-American writings. Alice Walker, Paule Marshall, and Octavia Butler figure into this radical turn toward various provocative work that includes The Color Purple, Praise Song for the Widow, and Kindred.

This course proposes to focus on these five women writers, their strategies and techniques, and the ways in which they differ though they share the same historic moment. Primary texts for the course include: Toni Morrison: Song of Solomon, Tar Baby, Beloved; Toni Cade Bambara: Gorilla, My Love, The Saltaters; Alice Walker: The Color Purple, The Temple of My Familiar, Paule Marshall: Brown Girl, Brownstone; Praise Song for the Widow; and Octavia Butler: Kindred.

ENGL 477 Children's Literature
Fall. 4 credits. Not offered 1995-96.

ENGL 478 Self and Nation in Asian American Literature (also Asian American Studies 478)

ENGL 479 Jewish-American Writing (also Jewish Studies 478, American Studies 479)

ENGL 480-481 Seminar in Writing
480, fall; 481, spring. 4 credits. Each section limited to 15 students. Students are encouraged to take English 280 or 281 and at least one 300-level writing course (or some indeterminate region between the two poles) depending on their attitude toward aggression. In addition, the situation of war can sharpen or fuzz existing gender boundaries applied to individuals, for instance requiring revised definitions of femininity when women enter the workplace in large numbers or creating new distinctions between "real" and "effeminate" men based on willingness to fight.

This seminar will examine diplomatic, journalistic, theoretical and imaginative writing, as well as political cartoons and films, dealing with three major wars in the twentieth century: World War I, World War II and the Vietnam War—the last in its encircling Cold War context. Students will lead one class discussion and write two 10-12 page papers.

ENGL 482 African American Modernist Writing
Fall. 4 credits. Not offered 1995-96.

ENGL 486 Women's Poetry
Spring. 4 credits. D. Mermin.
A study of the female poetical tradition and the myths surrounding the figure of the female poet in England and America, focusing on such nineteenth- and twentieth-century poets as Elizabeth Barrett Browning, Emily Dickinson, Elizabeth Bishop, and Sylvia Plath.

ENGL 491 Honors Seminar I
Fall. 4 credits.
Section 1. Wharton, Jewett, and Cather.
D. Fried.
An examination of the major novels and stories of Edith Wharton, Sarah Orne Jewett, and Willa Cather. Focus will be on close analysis of works such as The House of Mirth, The Custom of the Country, and The Age of Innocence (Wharton), Deephaven and The Country of the Pointed Firs (Jewett), and The Song of the Lark, My Antonia, A Lost Lady, and The Professor's House (Cather). Topics may include: "regionalism" and realism; women and literary professionalism in America 1870-1930; presentations of speech communities, gender and class; the role of taletelling; ghost stories and the haunting of a vanished past; the changing reputation of these writers and reasons for their current high standing; literary interpretation and film adaptation. Some attention will be given to a range of critical approaches (including feminist, deconstructive, linguistic, and biographical), and to methods of research, uses of evidence, and preparation for the writing of an honors essay.

Section 2. Early Shakespeare.
D. Mermin.
We will read several of Eliot's major novels, from Adam Bede to Daniel Deronda, along with essays and letters, and try to gain as full a sense as possible of the works, the career, and the literary, intellectual, social, and cultural situation of the foremost Victorian woman novelist.

A selection of major fiction, poetry, and drama from the period of the French Revolution and its aftermath, read in conjunction with a focus on a range of political, social, and economic issues (e.g., parliamentary reform, consolidation of empire, civil liberties, slavery and the slave trade, the changing literary marketplace) and on questions of aesthetics in a time of public ferment and reaction. Works by such writers as Blake, Burke, Wollstonecraft, Inchbald, Wordsworth, Coleridge, Godwin, Byron, Scott, Austen, the Shelleys, Hazlitt, and Carlyle.

ENGL 493 Honors Essay Tutorial I
Fall or spring. 4 credits. Prerequisites: senior standing and permission of Director of the Honors Program.

ENGL 494 Honors Essay Tutorial II
Fall or spring. 4 credits. Prerequisites: English 493 and permission of Director of the Honors Program.

ENGL 495 Independent Study
Fall or spring. 2-4 credits. Prerequisites: Permission of departmental adviser and director of undergraduate studies.

Courses Primarily for Graduate Students
Permission of the instructor is a prerequisite for admission to courses numbered in the 600s. These are intended primarily for graduate students, although qualified undergraduates are sometimes admitted. Undergraduates seeking admission to a 600-level course should consult the instructor. The list of courses given below is illustrative only, a definitive list, together with course descriptions and class meeting times, is published in a separate department brochure before course enrollment each term.

Graduate English Courses 1995-96

ENGL 600 Colloquium for Entering Students
Fall or spring. 2-4 credits. Prerequisites: Permission of Director of the Honors Program.

ENGL 606 The Subject Possessed (also English 406, Society for the Humanities 408)
ENGL 609 Disillusion and Disappointment (also ENGL 409, Society for the Humanities 409, and Comparative Literature 409)
ENGL 611 Introduction to Old English (also ENGL 411)
ENGL 613 Middle English (also ENGL 413)
ENGL 619 Chaucer
ENGL 627 Shakespeare: The Character of Money
ENGL 629 Milton
ENGL 643 Imagining Napoleon and other Revolutionary Aftermath
ENGL 649 19th Century Prose: Culture, Aesthetics and Gender in the Victorian Era
ENGL 651 Oscar Wilde
ENGL 663 Culture of Realism
ENGL 677 Talking Poetry
ENGL 683 The Theatre of Soyinka and Fugard
ENGL 685 Reconstructing the Era: Nineteenth Century African American Women's Literature and Society
ENGL 693 On Minority Discourse
ENGL 702 Key Issues in Contemporary Theory: An Introduction
ENGL 703 Theorizing Film: Race, Sexuality, and Psychoanalysis (also RF 417, LIT 695)
ENGL 734 Colonialism and Eighteenth Century Literature
ENGL 780.2 MFA Seminar: Fiction
ENGL 780.1 MFA Seminar: Poetry
ENGL 785 Close Reading for Writers
ENGL 781.1 MFA Seminar: Poetry
ENGL 781.2 MFA Seminar: Fiction

FRESHMAN WRITING SEMINARS

For information about the requirements for freshman writing seminars and descriptions of seminar offerings, see "Special Programs and Interdisciplinary Studies" at the end of the Arts and Sciences section of this catalog and consult the John S. Knight Writing Program brochure, available from college registrars in August for the fall term and in November for the spring term.

GEOLOGICAL SCIENCES


As an intercollege unit, the Department of Geological Sciences has degree programs in both the College of Arts and Sciences (B.A. degree) and the College of Engineering (B.S. degree). Currently, most of the undergraduate majors are in the College of Arts and Sciences. There are eighteen faculty members.

We live on a planet with finite resources and a finite capacity to recover quickly from human-induced environmental stresses. It is also a powerful planet, with geologic hazards such as earthquakes and volcanic eruptions that alter the course of history with little cause and effect. Understanding the earth and its resources becomes progressively more important for both future policy makers and ordinary citizens. Because the human need to understand the earth is so pervasive, we provide our students with a broad and solid minimal set of required courses plus room to explore more specialized topics with well-chosen electives within and outside the department.

Studies of the earth are becoming increasingly focused on environmental applications. Department faculty members collaborate in research and teaching with faculty from Civil and Environmental Engineering (soil and rock mechanics, biological science, Environmental Science and Engineering, Soil, Crop, and Atmospheric Sciences, Biological Sciences, and many others). Students who major in geology are urged to take courses to broaden their experience in other sciences, engineering, and mathematics.

The Department of Geological Sciences is also taking part in a new intercollege program in the Science of Earth Systems, which will be available to students in the Colleges of Arts and Sciences, Engineering, and Agricultural and Life Sciences beginning fall 1995. This program, which is being developed as a new intercollege major, will emphasize a strong foundation in basic mathematics and sciences and an integrated approach to the study of the earth system including the lithosphere, biosphere, hydrosphere, and atmosphere. The aim is to prepare students for graduate study and careers across the broad spectrum of earth sciences required for successful understanding and management of our planet. For a description of the program and proposed requirements for the major see the Science of Earth Systems section in 'Interdisci-

plinary Centers, Programs, and Studies,' in the front part of the catalog.

In addition to course work, students learn by involvement in research projects. Facilities include equipment for processing seismic signals and digital images of the earth's surface, isotopic analytical instruments, and extensive libraries of earthquake records, satellite images, and exploration seismic records. High-pressure, high-temperature mineral physics research uses the diamond anvil cell and the Cornell High Energy Synchrotron Source (CHESS).

Employment opportunities include environmental sciences (groundwater management, waste disposal), resource development (petroleum and minerals), public policy, education, and research. Undergraduates have served as field assistants for faculty members and graduate students in Argentina, British Columbia, the Aleutian Islands, Scotland, Switzerland, Tibet, and Barbados. Undergraduates are encouraged to participate in research activities, frequently as paid assistants.

The Major

The prerequisites for admission to a major in geological sciences in the College of Arts and Sciences are two two-semester sequences in Mathematics 111—112 or 191—192 and Physics 207—208 or 112—213, or their equivalents, and a semester course in chemistry, such as Chemistry 207 or 211. Geological Sciences 101,103,111, or 201, followed by 102, 104, or 206 are strongly recommended, but a student with a strong foundation in mathematics and science may be accepted as a major without completion of an introductory sequence.

Majors take Geological Sciences 210 and 214 (which collectively equal 1 course credit), the five 300-level core courses in geological sciences, 6 credits of additional course work from geological sciences courses numbered 300, 400, or 600, plus an additional course in either computer science or biological science, or an intermediate-level course in biological science, mathematics, chemistry, or physics. In addition, a requirement for field experience may be met by completing one of the following: (a) GS 491—492 (Undergraduate Research) based on field work (2 credit minimum); (b) GS 457 (Geophysical Field Methods) as an additional field approved elective (3 credits); (c) an approved field course taught by another college or university (3 credit minimum); (d) GS 212 (Special January Field Trip) (2 credits). Field observations made during GS 212 could be the basis for GS 491—492. Majors are encouraged to undertake a research project or honors thesis.

Core Courses

GEOL 326 Structural Geology
GEOL 355 Mineralogy
GEOL 356 Petrology and Geochemistry
GEOL 375 Sedimentology and Stratigraphy
GEOL 388 Geophysics and Geotectonics

Prospective majors should consult one of the following departmental major advisers—W. A. Bassett, J. M. Bird, A. L. Bloom, L. M. Cathles, J. L. Cisne, D. E. Karig, or S. Mahlburg Kay—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- and 400-level courses in geology also may be of particular interest to students of chemistry, biology, ecology, and physics. Students are encouraged to inquire about courses that interest them at the department office in Snee Hall.

Honors. An honors program is offered by the Department of Geological Sciences for superior students. Candidates for honors must maintain an overall 3.0 grade-point average; a cumulative average of 3.5 in the major, and complete an honors thesis (Geological Sciences 490). Students interested in applying should contact the director of undergraduate studies during the second semester of the junior year.

Courses
For complete course descriptions, see the Geological Sciences listing in the College of Engineering section.

GEOL 101 Introductory Geological Sciences
Fall, spring, summer. 3 credits.

GEOL 102 Evolution of the Earth and Life (Bio S 170)
Spring. 3 credits. GEOL 101 recommended.

GEOL 103 Introductory Environmental Geology
Fall. 3 credits.

GEOL 104 The Sea: An Introduction to Oceanography
Spring. 3 credits.

GEOL 105 Writing on Rocks (Freshman Seminar)
Fall. 3 credits. See freshman seminar handbook for description.

GEOL 108 Geology and Society
Spring. 1 credit. May be taken concurrently with or after GEOL 101, 102, 103, 104, 111, 201, or 206.

GEOL 109 Dinosaurs
Fall. 1 credit.

GEOL 111 To Know the Earth and Build a Habitable Planet
Fall. 3 credits.

GEOL 122 Earthquake! (also Engineering 122)
Fall. 3 credits.

GEOL 123-124 Science of Earth Systems Colloquium (also SES 101-102 and SCAS 101-102)
For course description, see the Science of Earth Systems section in "Interdisciplinary Centers, Programs, and Studies," in the front part of the catalog.

GEOL 201 Introduction to the Physics and Chemistry of the Earth (also ENGRD 201)
Spring. 3 credits. Prerequisites: Mathematics 191 and Physics 112.

GEOL 203 Natural Hazards and the Science of Complexity
Fall. 3 credits. Prerequisites: 2 math courses, 1 physics course.

GEOL 204 Hydrology and the Environment (also SCAS 371 and ABEN 371)
Spring. 3 credits. Prerequisite: GEOL 101, 103, or 201. Weekly field sessions. A weekend field trip.

GEOL 206 Geologic Perspective on Climate Changes
Spring. 3 credits.

GEOL 210 Introduction to Field Methods in Geological Sciences
Fall. 3 credits. Prerequisite: GEOL 101, 103, or 201. Offered alternate years.

GEOL 212 Special January Field Trip
Fall. 2 credits. Prerequisites: GEOL 101 or 201 or equivalent, and permission of instructor. Travel and subsistence expenses to be announced.

GEOL 213 Marine and Coastal Geology
Summer. 2 credits. Prerequisites: an introductory course in geology or permission of instructor.

GEOL 214 Western Adirondack Field Course
Spring. 1 credit. Prerequisite: GEOL 210 or equivalent, or permission of instructor.

GEOL 202 Evolution of the Earth System (also SES 332 and SCAS 302)
Fall. 3 credits. Prerequisite: GEOL 101, 103, or 201. Recommended: GEOL 356. Offered alternate years.

GEOL 326 Structural Geology
Spring. 4 credits. Prerequisite: GEOL 101, 103, or 201, or permission of instructor.

GEOL 355 Mineralogy
Fall. 4 credits. Prerequisite: GEOL 101, 103, or 201 and Chem 207 or permission of instructor.

GEOL 356 Petrology and Geochemistry
Spring. 4 credits. Prerequisite: GEOL 355.

GEOL 375 Sedimentology and Stratigraphy
Fall. 4 credits. Prerequisite: GEOL 101, 103, or 201.

GEOL 388 Geophysics and Geotectonics
Spring. 4 credits. Prerequisites: Mathematics 192 and Physics 208, 213, or equivalent.

GEOL 411 Global Change Research: Mountains, Climate, and Erosion
Fall. 3 credits.

GEOL 423 Petroleum Geology
Fall. 3 credits. Recommended: GEOL 326. Offered alternate years.

GEOL 425 Precambrian Orogenic Cycles
Fall. 3 credits. Prerequisites: GEOL 326 or GEOL 356. Offered alternate years. Not offered 1995-96.

GEOL 426 Geologic Evolution of South America
Spring. 3 credits. Prerequisite: GEOL 326, 356, or permission of instructor. Not offered 1995-96.

GEOL 427 Geophysical Field Methods
Fall. 3 credits. Prerequisites: Physics 213 and Mathematics 192 or equivalent, or permission of instructor. Offered alternate years.

GEOL 436 Environmental Geophysics
Spring. 3 credits. Offered alternate years. Prerequisite: PHYS 213 and MATH 192 or equivalent, or permission of instructor.

GEOL 437 Geophysical Field Methods
Spring. 3 credits. Prerequisites: Physics 213 and Mathematics 192 or equivalent, or permission of instructor. Offered alternate years.

GEOL 438 Exploration Seismology II: Analysis and Interpretation
Spring. 3 credits. Offered alternate years. Not offered 1995-96.

GEOL 439 Reflection Seismology I: Data Acquisition and Processing
Fall. 3 credits. Offered alternate years. Not offered 1995-96.

GEOL 441 Geomorphology
Fall. 3 credits. Prerequisites: GEOL 101, 103, or 201, or permission of instructor.

GEOL 442 Glacial and Quaternary Geology
Spring. 3 credits.

GEOL 445 Geohydrology (also ABEN 471 and C&EE 431)
Fall. 3 credits. Prerequisites: Mathematics 294 and Engr 202.

GEOL 452 X-ray Diffraction Techniques
Spring. 3 credits. Prerequisite: GEOL 355 or permission of instructor. Offered alternate years.

GEOL 453 Advanced Petrology
Fall. 3 credits. Prerequisite: GEOL 356. Offered alternate years. Not offered 1995-96.

GEOL 454 Advanced Mineralogy
Spring. 3 credits. Prerequisite: GEOL 355 or permission of instructor. Offered alternate years. Not offered 1995-96.

GEOL 455 Geochemistry
Fall. 4 credits. Prerequisites: Chemistry 207 and Mathematics 102, or equivalent. Recommended GEOL 356. Offered alternate years.

GEOL 457 Metamorphic Petrology
Fall. 3 credits. Prerequisite GEOL 355. Offered alternate years.

GEOL 458 Volcanology
Spring. 3 credits. Prerequisites: GEOL 356 or equivalent. Offered alternate years. Not offered 1995-96.

GEOL 459 Sedimentary Basins: Tectonics and Mechanics
Spring. 3 credits. Prerequisite: GEOL 375 or permission of instructor. Offered alternate years.

GEOL 476 Advanced Stratigraphy
Spring. 3 credits. Prerequisites: GEOL 375 or permission of instructor. Offered alternate years. Not offered 1995-96.

GEOL 483 Paleobiology (also Bio ES 479)
Fall. 3 credits. Prerequisites: BIO G 101-102 and 103-104 or equivalent, and either GEOL 375, BIO ES 274, BIO ES 373, or permission of instructor. Offered alternate years.

GEOL 481 Senior Survey of Earth Systems
Fall. 3 credits. Limited to seniors majoring in geological sciences.
GEOL 490 Honors Thesis (B.A. degree candidates)
Fall, spring. 2 credits.

GEOL 491-492 Undergraduate Research
Fall, spring. 1 or 2 credits variable.

GEOL 500 Design Project in Geophysics
Fall, spring. 3-12 credits. An alternative to an industrial project for M.Eng. students choosing the geophysics option. May continue over two or more semesters.

GEOL 502 Case Histories in Groundwater Analysis
Spring. 4 credits.

GEOL 622 Advanced Structural Geology I
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years.

[GEOL 624 Advanced Structural Geology II
Spring. 3 credits. Prerequisites: GEOL 326 and permission of instructor. Offered alternate years. Not offered 1995-96.]

GEOL 628 Geology of Orogenic Belts
Spring. 3 credits. Prerequisite: permission of instructor.

[GEOL 635 Advanced Geophysics I: Fractals and Chaos in Geology and Geophysics
Fall. 3 credits. Prerequisite: GEOL 388 or permission of instructor. Not offered 1995-96.]

GEOL 636 Advanced Geophysics II: Quantitative Geodynamics
Spring. 3 credits. Prerequisite: GEOL 388 or permission of instructor.

GEOL 651 Analysis of Biogeochemical Systems
Fall. 3 credits. Prerequisite: MATH 293 or permission of instructor.

GEOL 656 Isotope Geochemistry
Spring. 3 credits. Open to undergraduates. Prerequisites: GEOL 455 or permission of instructor. Offered alternate years.

GEOL 681 Geotectonics
Fall. 3 credits. Prerequisites: permission of instructor.

GEOL 685 Computer Methods in Geological Sciences
Fall, spring. 3 credits.

GEOL 700-799 Seminars and Special Work
Fall, spring. 1-3 credits. Prerequisite: permission of instructor. Advanced work on original investigations in geological sciences. Topics change from term to term.

GEOL 722 Advanced Topics in Structural Geology

GEOL 725 Rock and Sediment Deformation

GEOL 731 Plate Tectonics and Geology

GEOL 733 Fractal Chaos - Independent Studies

GEOL 741 Advanced Geomorphology Topics

GEOL 751 Petrology and Geochemistry

GEOL 753 Advanced Topics in Mineral Physics

GEOL 755 Advanced Topics in Petrology and Tectonics

GEOL 757 Current Research in Petrology

GEOL 762 Advanced Topics in Petroleum Exploration

GEOL 771 Advanced Topics in Sedimentology and Stratigraphy

GEOL 773 Paleobiology

GEOL 780 Seismic Record Reading

GEOL 781 Geophysics, Exploration Seismology

GEOL 783 Advanced Topics in Geophysics

GEOL 789 Lithospheric Seismology (CCORP Seminar)

GEOL 793 Andes-Himalaya Seminar

GEOL 796 Geochemistry of the Solid Earth

GEOL 797 Fluid-Rock Interactions

GEOL 799 Soil, Water, and Geology Seminar

GERMAN STUDIES

D. Bathrick, B. Baettner, H. Deinert, J. Ezenquiz, S. L. Gilman, A. Groos, P. U. Hohenhahl, B. Martin. chair, L. M. Olschner, graduate faculty representative, G. Waite, director of undergraduate studies

Major areas of specialization cover the period from the early Middle Ages to the twentieth century. These areas are offered within the department or in cooperative arrangements with the departments of Comparative Literature and Women's Studies, many of which complement the course offerings in German.

Students majoring in German are expected to become competent in the German language. This competence is normally demonstrated by the successful completion of German 304. Placement of German majors who have done no work in German at Cornell will be determined by the level of preparation they have obtained elsewhere. For information, students should consult the director of undergraduate studies, G. Waite, or W. Harbert.

The German Area Studies Major

The German area studies major is intended for students who are not necessarily interested in subject matter related to German-speaking countries but not necessarily or not exclusively in German literature or linguistics. Students will select appropriate courses offered in history, government, economics, music, theater arts, or other related departments.

Minimum course requirements for the German area studies major are the same as for the German major. Students may 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. Students should consult the director of the German area studies major to design their program and supervise their progress. One committee member must be from the German faculty. Students should select the courses offered in history, government, economics, music, theater arts, or other related departments.

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. Minimum of six area courses above the 200-level is required for the major; one of the six courses must be a senior seminar (German Studies 410).

Advanced Standing.

Students with an AP score of 4 or better are automatically granted three credits in German literature. Students coming to Cornell with advanced standing in German and/or another subject often find it possible to complete two majors. Recent double majors have combined history, psychology, chemistry, biology, or physics with German literature or German area studies. Students in Agriculture and Engineering have entered dual degree programs. Double majors will complete separate programs, one for each major.

Honor.

The honors program in German is open to superior students who want to work independently in an area of their own choice. Students are free to select any faculty member of the Field of Germanic Studies (in the case of area studies majors, the appropriate member of their committee) to assist them in designing their honors program, to supervise their work, and to help them select a suitable topic for an honors essay. The independent study courses, German 451 and 452, may form part of the program.
GERST 201 Introduction to German Literature I: Prose
Fall or spring. 3 credits. Prerequisite: qualification in German or permission of instructor. Fulfills both the language proficiency requirement and, followed by German 202 or another German literature course at the 200-level or above, the humanities distribution requirement. Staff. An intermediate course designed to improve reading, writing, speaking, and listening skills in German. Emphasis is placed on developing reading competency, tools of literary analysis, and expansion of vocabulary. Grammar review included. The complexities of inner and outer reality as expressed in selected prose works of Buchmann, Brecht, Kafka, Mann, Dürenmann, Aichinger and others.

GERST 202 Introduction to German Literature II: Drama
Fall or spring. 3 credits. Prerequisite: German 201 or permission of instructor. Taught in German. Fulfills both the language proficiency requirement and, together with German 201 or another German literature course at the 200-level or above, the humanities distribution requirement. Staff.

An intermediate course designed to improve reading, writing, speaking, and listening skills in German. Emphasis is placed on developing reading competency, tools of literary analysis, and expansion of vocabulary. Grammar review included. The complexities of inner and outer reality as expressed in selected prose works of Buchmann, Brecht, Kafka, Mann, Dürenmann, Aichinger and others.

GERST 211 Intensive Workshop in Germanic Studies for Freshmen I
Fall. 6 credits. Intended for entering freshmen with extensive training in the German language (CPT achievement score of 650, AP of 3, or comparable evidence; please consult instructor). Taught in German. Satisfies the language and distribution requirements or the freshman writing seminar requirement. H. Deinert.

Not intended as a survey but rather as a rigorous seminar designed to familiarize students with literary forms and the tools of critical analysis. The course will provide an intensive introduction to the study of German literature through the discussion of exemplary prose works, dramas, and poems from the eighteenth and nineteenth centuries.

GERST 307 Modern Germany
Not offered 1995-96.

GERST 312 Intensive Workshop in Germanic Studies for Freshmen II
Spring. 4 credits. Intended primarily for freshmen with extensive training in the German language (CPT achievement score of 650 or minimum AP score of 3, or comparable evidence; please consult instructor). Taught in German. Satisfies the language and distribution requirements or the freshman writing seminar requirement. H. Deinert.

Designed mainly as a sequel to the Intensive Workshop I (German 211). The emphasis is on German literature, culture, and political history in the first half of this century. Readings include works by Hofmannsthal, Thomas Mann, Hesse, Kafka, Brecht, Weiss, and Plenzdorf. The visual arts, music, and theater will serve as additional tools of interpretation.

GERST 315 German Poetry from the Middle Ages to the Present
Fall or spring. 4 credits. Prerequisite: German 201-202 or permission of instructor. Taught in German. H. Deinert.

The Prussian aristocrat Heinrich von Kleist, who has been compared by some to Aeschylus and Shakespeare, committed suicide in 1811 at the age of thirty-four because "I have run out of options." We will examine his dramas and prose writings against the background of revolutionary turmoil in Europe and the Americas and the Wars of National Liberation.

GERST 354 Schiller
Fall. 4 credits. Prerequisite: German 201-202 or permission of instructor.

Taught in English with optional discussion section in German if students request it. A survey of Schiller's major dramas, poetry, and theoretical writings, situating these texts amid changing discourses of the Age of Revolution: revolution in the political and private sphere, the modern state and the problematic of freedom, discourses of love and sexuality, alienation and the role of the aesthetic. A final segment of the course will be devoted to Schiller's reception in nineteenth-century opera.

GERST 357 Major Works of Goethe
Not offered 1995-96.

GERST 365 Austrian Literature
Not offered 1995-96.

Courses in English Translation

GERST 320 Postwar German Novel
Not offered 1995-96.

GERST 322 Medicine and Civilization (also Biology and Society 322)
Not offered 1995-96.

GERST 330 Political Theory and Cinema (also Comparative Literature 330, Government 370 and Theatre Arts 330)
Not offered 1995-96.

GERST 347 Reading Freud: Race, Gender, and Psychoanalysis (also Comparative Literature 347, English 347, Psychology 389)
Not offered 1995-96.

GERST 351 Freud: Optional Clinical Discussion Seminar (also Comparative Literature 351, English 346 and Psychology 391)
Not offered 1995-96.

GERST 374 Opera and Culture (also Music 374)
Spring. 4 credits. Prerequisite: any three-credit music course or proficiency in German or Italian. A. Groos.

This course is designed to explore interrelationships between opera and cultural practice, using examples principally from the German and Italian repertories (e.g., Mozart, Wagner, Verdi, Puccini, Strauss). Lectures and discussion will examine operatic representations of central issues in the emergence of modern culture in the late eighteenth and nineteenth centuries: politics and national identity, issues of gender and sexuality, orientalism, representations of madness and disease. Depending on student interest, a final segment of the semester may extend our focus into twentieth-century opera or other media such as film and theatre.

GERST 383 Faust in Legend, Literature, and the Arts (also Comparative Literature 383)
Not offered 1995-96.
GERST 396 German Film (also Comparative Literature 396 and Theatre Arts 396)
Spring. 4 credits. Requirements: participation in class discussion, one paper, midterm, and final. D. Barthick. The goal of the course is to explore the form and context of German film in relation to the cultural and sociopolitical context of which it is a part. Accordingly, the material discussed will be divided into three major periods: Weimar film 1918–1933, Nazi film, 1933–1945, Postwar film, 1945–present. Readings and lectures will be devoted to formal and cultural developments in the history of German film as well as interpretive analysis of selected individual films. In both lectures and discussions, particular emphasis will be placed on helping students develop an appropriate method for viewing and analyzing film.

GERST 413 Women around Freud (also Comparative Literature 412 and Women's Studies 413)

GERST 414 History into Fiction: Nazis and the Literary Imagination (also English 404, Comparative Literature 404)

GERST 415 Marx, Freud, Nietzsche (also Comparative Literature 425 and Government 473)
Fall. 4 credits. G. Waite. There are three main aspects to this course. First and primarily, it provides an introduction to the thinking of these three “master thinkers” who have determined much of modernity and postmodernity. Here, basic aspects of their work are considered: (a) scientific and theoretical writings; (b) specific critical and historical analyses; (c) programs and manifestos; and (d) styles of argumentation, documentation, and persuasion. (This also entails an introduction, for non-specialists, to basic problems of economics, philosophy, psychology, and historiography.) Second, we will compare and contrast the underlying assumptions and interpretive yields of the various disciplines and practices that Marx, Nietzsche, and Freud helped to ground: historical materialism and communism, psychoanalysis and psychopathology, respectively. Finally, but less thoroughly, we will discuss the ways these three thinkers have been fused together into a single constellation or troika: “Marx-Nietzsche-Freud.” The main focus of the course will be on primary texts, which might include, e.g.: (Marx) The Communist Manifesto, The 18th Brumaire, Critique of the Gotha Program, and selections from The Paris Manuscripts, Grundrisse, and Capital; (Nietzsche) The Birth of Tragedy, “The Greek State,” “On Truth and Lie in the Extraordinary Sense,” On the Genealogy of Morals, On the Genealogy of Morals, and selections from The Birth of Tragedy; and (Freud) two case studies, On Dreams, Civilization and Its Discontents, Three Essays on the Theory of Sexuality, and selections from The Psychopathology of Everyday Life and Introductory Lectures.

GERST 418 Thomas Mann
Fall. 4 credits. In English. There may be a discussion section in German if students request it. 1. Erzegalius. We will read Mann’s major works, as well as materials (his own essays, criticism, political and philosophical debates) surrounding their production and publication. As Mann’s work covers a large span, we will have occasion to think about German problems and possible responses to them before World War I, between the wars, and during World War II. Buddenbrooks, Magic Mountain, Dr. Faustus, and Felix Krull, are some of the texts to be read closely.

GERST 455 Comparative Democratization (also GOVT 455)
Fall. For description, see GOVT 458.

GERST 465-462 Independent Study
451. Fall, 452, spring. 1–4 credits each term. Prerequisite: permission of instructor.

GERST 472 Poetry of the 1990s (also Comparative Literature 472)

GERST 492 The Advance of Humanism: Aspects of the European Enlightenment

GERST 496 Theorizing the Public Sphere (also Comparative Literature 496 and History 496)

GERST 600 Special Topics in Feminist Theory (also Anthropology 600 and Comparative Literature 600)

GERST 608 Modern/Postmodern (also Comparative Literature 608)

GERST 621 Issues in Gay and Lesbian Studies (also Women's Studies 621)

GERST 623 Seminar in Medieval German Literature I
Fall. 4 credits. Prerequisite: German 405-406 or equivalent. Topic: Romantic. A. Groos.

GERST 626 Nuremberg
Spring. 4 credits. Prerequisite: permission of instructor. Anchor course for the 16th century. A. Groos. An introduction to Nuremberg in the late fifteenth and sixteenth centuries, with emphasis on its significance as an early modern urban center. Topics include the city's development and social structure, pre- and post-Reformation attempts to fashion its image and history, public spectacle and imperial entries, literary and artistic humanism (Celtis and Dürer), social order and social conflict (Fastnachtspiel, antisemitism), constructions of gender and marginal figures. The last part of the course will deal with the reception of early modern Nuremberg from Goethe through the Romantics, including Wagner.

GERST 627 Baroque

GERST 629 The Enlightenment

GERST 630 Classicism and Idealism
Spring. 4 credits. Texts in German, discussion in English. Anchor course. G. Waite. An introduction to some of the major poetic and philosophical texts generally considered to be part of the canon of “Classicism” (roughly 1786–1832), while at the same time giving reasons to call into question notions of the canon and of periodization, particularly as these have tended to exclude women and others. In addition to the basic problem of the appropriation of classical antiquity at a period marked by the transition to bourgeois modernity, special consideration is given to the informing theoretical principle of the period: i.e., the diacritic. Samples from all major genres, including the problem of classicism in other media, notably the visual arts in France (David). Selected readings from Goethe, Hegel, Holderlin, Kleist, Lessing, Kant, Schiller, Winckelmann, and one Greek text. While the main focus of this anchor course is on primary texts, we will also
consider critiques of classicism, idealism and the dialectic by such writers as Adorno, Althusser, Byson, Deleuze, Foucault, Heidegger, Kierkegaard, Nietzsche, and Marx. The written work for the seminar will consist of take-home examination, and we will discuss methodological problems related to teaching the topic to undergraduates.

**GERST 634 German Romanticism**

**GERST 637 Novelle Workshop**
Fall. 4 credits. Taught in German.
H. Deinet.
Course is intended (1) as an introduction to the prominent German narrative and (2) as a workshop in undergraduate curriculum development.

**GERST 640 Paul Celan and the Shoah**
(also Comparative Literature 640 and Jewish Studies 610)
Spring. 4 credits. Open to qualified undergraduates with permission of instructor. Good reading knowledge of German required. L. M. Olschner.
Paul Celan, now widely recognized as one of the most important European poets in this century, has contributed to the Ashkenazi identity in Rumania who spoke German at home, Celan never lived in a German-speaking environment after moving to Paris in 1948. Having lost his parents in a concentration camp, he lived the fractured existence of writing in the language of the murderers. The seminar examines Celan’s cultural background in Czezovitz and his indebtedness to romanticism, symbolism, and Surrealism; the context of the Cabala and the Shoah; intertextual connections with Holderlin, Rilke, and Mendelstam, as well as dialogues with Heidegger, Benn, and N. Sachs; his translations from seven languages; and poetics and the reception of his poetry, especially in the conservative climate of the Federal Republic of Germany.

**GERST 647 German Literature from 1945 to 1969: Questions of Modernity and Identity**

**GERST 651 Exile Literature**

**GERST 652 Culture in Germany 1933–1945**

**GERST 653 Opera (also Comparative Literature 655 and Music 679)**

**GERST 660 Visual Ideology (also Comparative Literature 660 and Theatre Arts 660)**
Spring. 4 credits. G. Waite.
Some of the most powerful approaches to visual practices have come from outside or from the peripheries of the institution of art history and criticism. This seminar will analyze the interactions between academically sanctioned disciplines (such as iconography and connoisseurship) and innovations coming from psychoanalysis, historiography, sociology, literary theory, mass media criticism, feminism, and Marxism. We will try especially to develop: (1) a general theory of "visual ideology" and/or "movement/image" to articulate these determinations. Examples will be drawn from the history of oil painting, architecture, city planning, photography, film, and other mass media.

**GERST 661 After the City from Metropolis to Electropolis**
(also Architecture 338/638 and Comparative Literature 661)

**GERST 664 Freud and the Fin de Siècle**
Fall. 4 credits. Reading knowledge of German necessary. J. Martin.
A survey of major late nineteenth- and early twentieth-century works reflecting the adoption of the biological mode as a central metaphor in German thought. Central to the course will be Freud's early work (Studien in Hysteria, Three Essays). Other writers to be read include Nietzsche, Haeckel, Andreas-Salomé, Wedekind, Hauptmann, Schnitzler, and Lombroso.

**GERST 666 Ingeborg Bachmann**

**GERST 673 Franz Kafka and the Problem of "Minor" Literature**
(also Comparative Literature 673)

**GERST 674 Contemporary Poetry and Culture: 1968–1993**
(also Comparative Literature 674)

**GERST 675 After the Divide: German Critical Theory of the Seventies and Eighties**
(also Comparative Literature 675 and History 675)

**GERST 679 Bertolt Brecht in Context**
(also Comparative Literature 679 and Theatre Arts 679)

**GERST 685 Gramsci and Cultural Politics**
(also Comparative Literature 685 and Government 675)

**GERST 687 The Politics of Culture in the German Democratic Republic**
Fall. 4 credits. D. Bathrick.
The initial sessions of the seminar will be devoted to studying Marxist-Leninist "narratives" about history, fascism, women, the Enlightenment, and production to understand how these have been translated into the principles of socialist realism and the institutional practices of "Kulturpolitik." We shall then trace out how thematic and formal challenges to these traditions (narratives) began to emerge in the 1960s and 1970s--around such prose writings as "Nachdenken über Christa T" by Christa Wolf; dramas by Ulrich Plenzdorf, Heiner Muller, and Volker Braun; the poetry of Sarah Kirsch, Rainer Kirsch, Franz Pühmann, Günter Kunert, Volker Braun and Wolf Biermann. Our look at the literature of the 1980s will include writers such as Imtraud Morgner, Helga Königsdorf and Christoph Hein as well as the younger poets of the Prenzlauer Berg.

**GERST 690 Feminist Criticism and Theory (also Women's Studies 690)**

**GERST 692 The Politics of Criticism**
(also Comparative Literature 692 and Theatre Arts 692)

**GERST 753-754 Tutorial in German Literature**
Fall and spring. 1–4 credits per term. Prerequisite: permission of instructor.

**Related Courses in Other Departments**

**Government**

**GOVT 669 Modern Social Thought**
S. Buck-Morss.

**History**

**HIST 357-358 Survey of German History**
I. V. Hull.

**HIST 474/674 Seminar in European Intellectual History**
D. LaCapra.

**HIST 674 German History from 1700-1918**
I. V. Hull.

**Modern Languages and Linguistics**

**GERLA 407 Teaching German as a Foreign Language**
Staff.

**GERLA 602 Gothic**
W. E. Harbert.

**LING 625 Middle Welsh**
W. E. Harbert.

**GOVERNMENT**


Government is what Cornell calls a department that elsewhere might be termed political science. The focus of this discipline is power applied to public purposes. Some faculty concentrate on purposes, some on applications. Some engage in the close reading of great texts of political philosophy, while others analyze the behavior of power wielders and publics in this and other societies. Government is divided into four subfields: U. S. politics, comparative politics (other nations), political theory (philosophy), and international relations (transactions between nations).

To accommodate new courses or course changes, a supplementary announcement is prepared by the department. Before enrolling in courses or registering each term, students are requested to consult the current supplementary listing courses in government, available in 125 McGraw Hall.

**The Major**

To be admitted to the major, a student must pass two government courses.
To complete the major, a student must
(1) pass two of the introductory government
courses (Government 111, 131 or 231, 161,
181 or 281); (2) pass one additional course in
one of the following subfields (American
government, comparative government,
political theory, or international relations).
This course may be any course offered in
the government department, including introduc­
tory courses, upper-level courses or seminars.
Students are strongly advised to take at least
one course in each of the four subfields;
(3) accumulate an additional 28 credits of
government course work at the 300-level or
above; (4) pass one seminar-level course
in government which may be applied
toward the 28 credits. These courses include
those numbered 400XX to which students are
admitted by application only; (5) accumulate
12 credits in upper-level courses in related
fields (such as anthropology, economics,
history, psychology, and sociology). Upper­
level courses are usually courses numbered at
the 300-level or above (200-level courses are
not considered). Students should consult
with their major adviser to choose
appropriate courses. All choices of related
courses must be approved by the major
adviser, or the director of undergraduate
studies; (6) complete at least one seminar-level
course in a government major must be passed
with a letter grade.

To summarize, a total of 10 government
courses and 3 additional courses (12 credits)
of upper-level related courses are required to
complete the major.

Cornell-in-Washington Program. Govern­
ment majors may apply to the Cornell-in-
Washington program to take courses and
undertake a closely supervised externship
during a fall or spring semester.

Study Abroad in Geneva. French, history,
and government majors, or other students
with a commitment to international experi­
ence, may study abroad in Geneva, Switzer­
land. Geneva is an especially appropriate
location for students with an interest in
international affairs, as many international
organizations maintain offices there, among
them the United Nations, the Red Cross, the
Heurich Foundation, and the World Health Organi­
zation, the International Labor Organization, the
International Telecommunications Union, the
World Intellectual Property Organization, the
International Telecommunications Union, the
European Nuclear Research Center, and the
European Community. Cornell students enroll full-time in the
University of Geneva and affiliated schools,
including the Graduate School of International
Studies (HEI) and the Development Studies
Institute, where they take year-long courses,
studying with Swiss and international students.
They can choose classes in many subjects,
including literature, economics and other
social sciences, law, theology, psychology,
education, science, social science, and
history. The University of Geneva offers four
consecutive three-week language and
international summer courses beginning in mid-
July, which prepare students for the manda­
tory French immersion class in early October.
Cornell students must attend the last of these
sessions, from mid-September to early
October, but earlier sessions are recom­
mended for students who need additional
language preparation.

Interested students can participate in
interships at international organizations, and
qualified participants may be able to work
under the direction of officials on research
studies that are of mutual interest.

Students must be Cornell undergraduates with
a strong academic record. The minimum
French preparation is the completion of
French 204 or 213, or its equivalent in
advanced credit or placement by the Cornell
C.A.S.E. examination. Students should plan to
study abroad for the entire academic year.
Students interested in the study abroad
program in Geneva should contact the Cornell
Abroad office (474 Uris) for further informa­
tion.

European Studies Concentrations. Govern­
ment 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. Katzen­
stein, Scheinman, and Tarrow for advice on
course selection and foreign study programs.

Model European Community Simulation.
Undergraduates with an interest in the
European Community, public affairs, or
debating may participate in the annual
Modern European Community Simulation (SUNYMEC) held in April at SUNY Brockport.
The simulation is an opportunity for partici­
pants, representing politicians from the
member nations of the European Community, to
discuss issues and resolutions of current
concern to the EC.

To prepare for this simulation, a 2-credit
independent study seminar is offered each
spring. Participation in the simulation will be
open only to those who register for this
seminar. Anyone interested in participating or
in finding out more information should
contact the Western Societies Program at 130
Uris Hall, 255-7502.

International Relations Concentration.
See the description under "Special Programs
and Interdisciplinary Studies."

Honors. Each fall a small number of
qualified seniors enter the honors program.
To apply, senior majors submit applications in
April. Along with a fuller description of the
honors program, application forms are
available in 125 McGraw Hall. The two
courses comprising the honors sequence
(honors courses) are described below.

Introductory Courses
Students registering for introductory courses
should register for the lecture only. Sections
will be assigned during the first week of class.
Introductory courses are also offered during
summer session.

GOVT 111 Introduction to American
Government and Politics
Fall and summer. 3 credits. T. J. Lowi.
An introduction to government through the
American experience. Concentration on
analysis of the institutions of government and
politics as mechanisms of social control.

GOVT 131 Introduction to Comparative
Government and Politics
Spring and summer. 3 credits.
J. Pontius.
This course provides a survey of the institu­
tions, political processes, and policies of
contemporary states. It focuses on the
conditions for and workings of democracy.

Looking at Western Europe, we will analyze
institutional variations among liberal democra­
cies, and their political implications. We will
then probe the origins of democracy in
Western societies and the reasons why
communism and other forms of authoritarian
rule have prevailed elsewhere. Finally, we will
explore the impetus behind and the
obstacles to democratization in the Third
World, and the European Community.
Throughout this survey, problems of
democracy will be related to problems of
economic development, efficiency, and
equality.

GOVT 161 Introduction to Political
Philosophy
Fall and summer. 3 credits. 1. Krannick.
A survey of the development of Western
political theory from Plato to the present.
Readings from the works of the major
theorists. An examination of the relevance of
their ideas to contemporary politics.

GOVT 181 Introduction to International
Relations
Spring and summer. 3 credits.
L. Scheinman.
An introduction to the basic concepts and
practice of international politics.

Freshman Writing Seminars
GOVT 100 Freshman Seminars
Fall, spring, or summer. 3 credits.

Seminars will be offered in fall, spring, and
summer terms. Consult the listings for the
Freshman Seminar Program in the section
"Special Programs and Interdisciplinary
Studies," the supplement issued by the
department, and the Freshman Seminar
booklet for course descriptions and
instructors.

Major Seminars
GOVT 400 Major Seminars
Fall or spring. 4 credits.

These seminars, designed to important
controversies in the discipline, cap the majors' experience. Thus preference in admission is
given majors over nonmajors and seniors over
juniors. Topics and instructors change each semester. To apply, students should pick up
an application in 125 McGraw Hall during the
course selection period the semester before
the seminar is given.

The following courses are open to sopho­
mores, juniors, and seniors without prerequi­
sites unless otherwise indicated.

American Government and Institutions
Looking 111 is recommended.

GOVT 121 Economic Growth and
Democratic Legitimacy
Summer. 3 credits. E. W. Kelley.
This course will explore the psychological,
economic, and participatory foundations for
the acceptance of democratic governments.
We will explore the effects of economic
growth, the distributions of income and
wealth and actual access to the ballot on
support for democratic institutions. Among
the authors we read will be: Adam Smith,
Max Weber, Emile Durkheim, David
McClelland, Rinehart Bendix, Anthony Downs,
Carolyn Bell, John Dollard, Neal Miller, James
Fallows, and Cornel West. We will conclude
by focusing on the degree of current
acceptance of democratic political institutions
in the United States.
The major political actors, institutions, and spoken by parents? mayors, city councils, bureaucracies, ethnic and racial minorities, urban machine politics, and the municipal reform movement. The implications of these political forces for policies pertaining to urban poverty, homelessness, and criminal justice.

GOVT 302 Social Movements in American Politics (also American Studies 302)
Fall. 4 credits. E. Sanders.
From populism to environmentalism, social movements directed to reform of national policies and political structures have been an earmark of American politics. This course will begin with an examination of late nineteenth-century agrarian and labor movements and move through progressivism, a variety of 1930s upsurges, civil rights, and more or less contemporary environmental, consumer, feminist, and peace movements. The focus will be on the conditions that give rise to these movements, their internal resources, and external alliances and their ultimate impact on the national state (as well as vice versa).

GOVT 303 Introduction to American Political Parties
Spring. 4 credits. J. Cowden.
This is a survey course about American political parties. The course will consider the following: the development of the American party system, realignments and critical elections, party identification, national, state, and local party organizations; theories of party decline; and the role of surrogate organizations such as the mass media. Throughout we will examine how and to what extent the actual function of parties is related to normative and theoretical models of party behavior.

GOVT 308 Science in the American Polity 1800-1960
Fall. 3 credits. M. Dennis.
For description, see S&TS 390.

GOVT 309 Science in the American Polity

GOVT 310 Power and Poverty in America
Spring. 4 credits. E. W. Kelley.
Despite egalitarian democratic rights, the United States remains a stratified society conspicuous for great disparities in the allocation of income and wealth. The purpose of this class is to investigate these disparities, both empirically and normatively, and to assess the impact of government upon them. Topics for discussion will include: what do we mean by distributional inequality and by the demand for greater egalitarianism? What is the extent of inequality and of poverty in America today? How does one establish minimum standards for distributional justice? Is the United States currently on the road toward achieving that minimum standard? What is the array of welfare programs presently available and what is their effect? What reforms or changes are currently on the political agenda? Can we imagine a society somewhat like that in the United States achieving a very different distribution of educational and occupational outcomes as described by race, income class, and language spoken by parents?

GOVT 311 Urban Politics
Fall. 4 credits. M. Sheffer.
The major political actors, institutions, and political styles are found in American cities: mayors, city councils, bureaucracies, ethnic and racial minorities, urban machine politics, and the municipal reform movement. The behavioral.
Courts play a central role in the formulation and enforcement of policy in the United States. However, courts are not all powerful; politicians and bureaucrats have a variety of ways to undermine judicial decisions. This course examines judicial control over policy by examining the relations among politicians, bureaucrats, and judges. To do so, we must examine how courts fit into the political process. Among the topics that we will consider are: statutory interpretation, administrative procedures, and constitutional review.

**GOVT 412 Voting and Political Participation**

**GOVT 413/613 Politics and Economics in Local Areas**

**GOVT 427 The Politics of Environmental Protection in America**

**GOVT 428-429 Government and Public Policy: An Introduction to Analysis and Criticism**
Fall, 428; Spring, 429. 4 credits each term. 428 and consent of instructor are required for 429. T. J. Lowi.
Government 428 concentrates on history and contemporary issues in public policy and the politics associated with them. Particular attention given to the origins and character of the regulatory state and the welfare state. Government 429 is an opportunity to pursue further the research begun in 428.

**Comparative Government**
Government 131 or 231 is recommended.

**GOVT 271 Introduction to African Development (also CRP 271 and ASRC 271)**

**GOVT 325 Eastern Europe**
Fall. 4 credits. V. Bunce.
This course will provide an introduction to the domestic and international politics of Eastern Europe. We will concentrate, first, on the historical development of this region before World War II. We will then turn to an analysis of communist revolutions and the construction of the socialist order in Eastern Europe. We will close the course with an analysis of the collapse of communist party rule in 1989 and the prospects for capitalism and liberal democracy.

**GOVT 332 Modern European Politics**
Fall. 4 credits. H. Kriesi.
This course presents an introduction to politics and political change in Western Europe. It starts from the formation of the European nation-state and the growth of democratic regimes after the French Revolution. It continues with the nature of European systems of government and with the political parties system; it then turns to the politics of public policy and to the interaction between policy-makers and societal interest groups. The course ends with an analysis of the interaction between politics and economics in the different countries. The main countries studies are France, Germany, Britain, Italy, and the Scandinavian countries, with the United States used as an external reference point.

**GOVT 333 Government and Politics of the Former Soviet Union**

**GOVT 335 America in the World**
Spring. 4 credits. M. Bernal.
Most studies of America deal with local or national political history. This course will pursue the influences of the United States on other continents, notably Europe, on the "New World" after 1492 or with the influences of other continents, notably Europe, on the "New World" after 1492. In this course, we shall look at the other sides of these pictures and consider contacts between America and the other continents of Asia, Europe, and Africa before Columbus, as well as some of the influences of America on the rest of the world after his arrival. The course will involve discussions with professor from anthropology, classics, and classics on the possibilities of Pre-Columbian contacts.

**GOVT 344 Latin American Politics**
Spring. 4 credits. H. Schamas.
This is the introductory lecture course to the politics of Latin America. The main purpose is to view the region in a conceptual and comparative perspective. Country cases will be introduced to provide an understanding of the significance of competing theoretical frameworks that have shaped the debate in the field. The class will focus on the political economies of the region for the role of groups and classes under different political regimes and contrasting strategies of development.

**GOVT 342 The New Europe**
Fall. 4 credits. U. Liebert.
German unification, the collapse of the Soviet bloc and the accelerating movement toward European unification have focussed attention on the shape and significance of the "New Europe." These changes have fueled both hopes for European democracy and new problems for European integration, as new states join the Union and new strains emerge within it. This course will focus on intergovernmental comparisons of EU member states, on the emerging weight of Germany as the strongest state in the Union, as well as on supranational institutional and political developments in the 1990s.

**GOVT 344 Government and Politics of Southeast Asia**
Fall. 4 credits. B. Anderson.
The course will focus on the comparative analysis of the nature and origins of political conflict in selected Southeast Asian nation-states. Particular attention will be given to nationalism/ethnicity, religion, and class, as well as to the differential impact of colonial rule.

**GOVT 350 Comparative Revolutions**
Fall. 4 credits. M. Katzenstein.
This course explores the social, economic, and political forces that have shaped India's development since independence. It considers why democratic political institutions in India have proved so resilient and what effect these institutions have on the economic and social policies that are pursued. The importance of international as well as domestic forces in shaping India's economic and political choices is also assessed.

**GOVT 354 America in the World Economy**

**GOVT 358 Modern History of the Middle East: Changing Politics, Society, and Ideas**
Fall. 4 credits.
For description, see NES 294.

**GOVT 430 Democracy, Power, and Economic Reform**
Spring. 4 credits. H. Schamas.
At a time of major political and economic reforms taking place in much of the Second and Third Worlds, and also in some of the First, fundamental questions about governance have been raised. The task before reformers is not limited to establishing a political system of individual rights and the rule of law, or of designing fair electoral systems and holding regular elections. It includes putting in place new forms of political power, or as Max Weber might put it, establishing new and effective systems of political domination. The reformers' need to carry out massive structural transformations has often implied centralizing authority, at the same time they are supposed to foster democracy. The dual challenge is
thus one that much of the political development theory has tended to see as sequential rather than simultaneous: to centralize political power in order to carry out major socio-economic transformations, and to build democratic institutions which, by definition, displace power. This seminar will examine these questions by focusing on some of the more important theoretical debates about the interrelationship between democracy and structural reform, the state and the economy, the crafting of order, and the creation of markets.

**GOVT 433 The Politics of Economic Liberalization in the Developing World**

Fall. 4 credits. H. Scharnhorst.

What drives the current processes of economic liberalization taking place in most countries? Which take part in these processes. The seminar addresses these questions by examining the interplay of domestic and international forces, and national and transnational institutions which take part in these processes. The course focuses extensively on, but is not limited to, Latin America.

**GOVT 434 Politics and Society in Modern Italy**

Spring. 4 credits. S. Tarrow.

Italy is a country that political scientists have not known how to understand. Too modern to be considered a “developing country,” its reputation for corruption, crime, and inefficiency has led to hesitation about considering it along with the “modern” states of Northern Europe. Yet Italy has one of the five or six most developed industrial economies in the world, is a center for technical and artistic innovation, and is the only state on the Mediterranean that has been functioning unimpeded as a parliamentary democracy since the end of World War II. Italy’s political system has always been a puzzle and, recently, it imploded upon itself.

**GOVT 437 Contemporary China: Society and Politics**

Spring. 4 credits. V. Shue.

Selected readings and in-class discussion of some of the central dilemmas that have been posed by the rapidly escalating processes of social change taking place under conditions of continuing political authoritarianism in China today. Topics include broad changes in demographic and social structure; rising tensions in family and gender relations; the enduring salience of community and workplace; the resurgence of Chinese nationalism; of ethnic nationalisms, of regionalism, and of popular religious movements; the significance of rising rates of crime and of political corruption; the growing crisis of social welfare delivery; and the limits on political dissent and on the development of civil society.

**GOVT 439 Japan in International Politics**

Spring. 4 credits. R. Bullock.

The course will focus on how Japan shapes and is shaped by the international environment, with particular emphasis on the post-cold war era. Our approach will be both thematic and institutional. Topics to be discussed include US-Japan trade friction, Japan’s investment and ODA in Southeast Asia, and cultural politics and notions of a New Asian Identity.

**GOVT 445 The Herodotean Moment: The Uses and Abuses of “Western Civilization” (also Comparative Literature 454, History 454)**

Spring. 4 credits. M. Bernal.

The basic premise of the seminar is that the concept of “Western civilization” is a problematic one in need of critical and historical analysis. The course will examine the evolution and transformation of this concept from antiquity to the twentieth century by focusing on selected moments (and texts in which they are represented) of actual and/or perceptual encounters with other civilizations. It will also inquire into the political uses and abuses of the idea of the West, and the literary, psychological, and anthropological dimensions of the idea’s history.

**GOVT 458 Comparative Democratization**

Fall. 4 credits. U. Liebert.

This course, taught as a seminar, will focus on the transition from authoritarian to liberal politics in recent decades. Comparisons of the democratization process will be made, using cases from Southern Europe, Germany, and East-Central Europe. Our focus will be divided between the empirics of these transitions and theoretical understandings of transitions to democracy.

**GOVT 468 Global and Domestic Dimensions of Science and Technology Policy (also S&TS 425)**


**Political Theory**

Government 161 is recommended.

**GOVT 469 Social and Political Philosophy (by petition for breadth requirement) (also Philosophy 242)**


**GOVT 361 Modern Ideologies: Liberalism and Its Critics**


**GOVT 362 Politics of Sexuality (also Women’s Studies 262)**


**GOVT 364 The Selfish Individual and the Modern World**


**GOVT 366 American Political Thought from Madison to Malcolm X (also History 316 and American Studies 366)**

Spring. 4 credits. I. Kramnick.

A survey of American political thought from the eighteenth century to the present. Particular attention will be devoted to the persistence of liberal individualism in the American tradition. Politicians, pamphleteers and poets will provide the reading. The professor offers insightful historical and social context.

**GOVT 368 Global Climate and Global Justice (also Philosophy 368)**


**GOVT 369 Introduction to Feminist Political Thought (also Women’s Studies 269)**


**GOVT 370 Political Theory and Cinema**


**GOVT 375 Visual Culture and Social Theory (also ART H 370 and Comp. Lit. 368)**

Spring. 4 credits. S. Buck-Morss and H. Foster.

Introduction to critical concepts for the analysis of visual culture, in specific socio-historical contexts.

**GOVT 376 Rethinking Marx**


**GOVT 377 Concepts of Race and Racism**

Spring. 4 credits. A. M. Smith.

This course examines race and racism from a political theory perspective. We will discuss the different types of racism: traditional racism, “new” cultural racism, and neo-conservative racism. We will then examine various radical approaches to anti-racism. Marxism, civil rights, black power, colonization theory, domestic underdevelopment theory, Omi and Winant’s racial formation framework, and women of color feminist theory. In the concluding section of the course, we will discuss the Los Angeles riots, contemporary debates on immigration in the United States, and the significance of race in American politics.

**GOVT 462 Modern Political Philosophy**

For description, see PHIL 546. R. Miller.

**GOVT 463 Politics of Contemporary Feminist Theory**


**GOVT 465 The Politics of Denunciation and Erasure (also SHUM 406)**

Fall. 4 credits. A. M. Smith.

If, following Nietzsche, Deleuze, and Foucault, we accept the basic argument that power can both reduce difference and multiply difference, what are the implications of their approach to power as a productive force for contemporary research on racial and sexual positionings. How are various hegemonized subject positions “massified,” such that they lose their individuality, “demonized,” such that they become excessive monster figures, or
"erased," such that their discourses are rendered invisible or incoherent? What are the linkages between this complex operation of authoritarian forces and the emergence of what has been called the "new racism," and what could be called the "new homophobia"? To what extent does the analysis of these new authoritarian formations shed light on contemporary resistance strategies? The seminar reading list will combine theoretical readings (Nietzsche, Deleuze, Foucault) with empirical material dealing with hegemonic representations of race and sexuality (Fanon, Said, Baldwin, Spillers [Angela] Davis, Jordan, Hooks, Chrenshaw, Williams, Higginbotham, Weeks, Robson, and Sedgwick).

[GOVT 466 Feminism and Gender Discrimination 4 credits. Not offered 1995-96.]

[GOVT 468 Global and Domestic Dimensions of Science and Technology Policy 4 credits. Not offered 1995-96.]

[GOVT 469 Limiting War Not offered 1995-96.]

GOVT 470 Anthropology-Theory-Politics-Performance (also Anthropology 470) Fall. 4 credits. S. Buck-Morss and J. Boreman.

An analysis of written and visual texts that expose the rough edges of interpretive coherence and question the self-evidence of knowledge as practice. Topics vary. The stress is on critical methods of readings.

GOVT 473 Marx, Nietzsche, Freud (also German Studies 415) Fall. 4 credits. G. Waite.

These are three main aspects to this course. First and primarily, it provides an introduction to the thinking of these three "master thinkers" who have determined much of modernity and postmodernity. Here, basic aspects of their work are considered: (a) scientific and theoretical writings; (b) specific critical and historical analyses, (c) programs and manifestos; and (d) styles of argumentation, documentation, and persuasion. (This also entails an introduction to, or, at least, a critical exposure to, basic problems of economics, philosophy, psychology—and literary criticism.) Second, we will compare and contrast the underlying assumptions and interpretive yields of the various disciplines and practices that Marx, Nietzsche, and Freud helped to ground: historical materialism and communism; power-knowledge analysis; and psychoanalysis, respectively. Finally, but less thoroughly, we will discuss the ways the three thinkers have been fused together into a single constellation or trikta: "Marx, Nietzsche, Freud."

International Relations

Government 181 or 281 is recommended.

GOVT 294 Global Thinking Fall. 4 credits. H. Shue.

The analysis taught in this course is global in two different respects: international subjects and interdisciplinary methods. We look in detail at two of the most important and most difficult issues facing international society, devoting approximately half the course to each case: (1) when, if ever, should other nations intervene militarily into ethnic conflict like that in Bosnia? and (2) what, if anything, should industrialized nations and industrializing nations respectively do to reduce the emissions that promote climate change? On military intervention, we bring together political science, law, and ethics; on climate change we bring together atmospheric chemistry, economics, and ethics. The course is taught by five leading faculty researchers from the fields listed.

GOVT 380 The Politics of German Unification Spring. 4 credits. U. Liebert.

The breakdown of the Cold War order and German unification in 1990 have produced a new phase in German and European politics. The return of the German nation-state coincided with the collapse of the Soviet hegemony in Eastern Europe and the broadening of the European integration process. This course will focus on the continuity and changes in the interaction between German and European politics. It will specifically elaborate the historical role of the national question in German politics and beyond: the international and domestic factors shaping the German unification in 1990; the impact of unification on the democratization and Westernization processes of the Bonn Republic; and the interaction of the New Germany with its European environment (European integration, Eastern Europe, immigration). In the end, students should be able to thoroughly understand the viability of and the challenges to democracy in Germany as well as the prospects for a hegemonic or democratic role of the New Germany in a changing Europe.


[GOVT 382 International Relations of East Asia 4 credits. Not offered 1995-96.]

[GOVT 383 Theories of International Relations Fall. 4 credits. A. Russo.

This course examines some of the main theories in international relations. It will consider a number of particularly important or influential works, along with discussions of methodology, research design, theory formation, and the evolution of the field as a whole. The course are to identify and criticize the central arguments advanced by different scholars in order to assess the relative merits of competing approaches to the main issues in the field.

[GOVT 384 War and Peace in the Nuclear Age (also Physics 206) 4 credits. Not offered 1995-96.]

[GOVT 385 American Foreign Policy 4 credits. Not offered 1995-96.]

[GOVT 388 International Political Economy Spring. 4 credits. J. Kirshner.

This course examines the politics of international political economic relations. It will draw on the history of the modern international economy and explore the theories that have been used to explain its evolution. The goals of the course are to gain insights into contemporary issues and to understand how scholars of international relations and economics describe and explain problems in the global economy.

[GOVT 389 International Law 4 credits. Not offered 1995-96.]

[GOVT 391 Chinese Foreign Policy Fall. 4 credits. T. Christensen.

This undergraduate lecture course will review and analyze the foreign policy of the People's Republic of China from 1949 to the present. Lectures will discuss the Cold War history of Beijing's relations with the Soviet Union, the United States, Southeast Asia, and the Third World. Various theories of foreign policy will be discussed as potential tools for understanding a Chinese foreign policy behavior. The class will conclude with a discussion of the future of Chinese foreign policy in light of the end of the Cold War, changes in the Chinese economy and the post-Tiananmen legitimacy crisis in Beijing.

[GOVT 393 Introduction to Peace Studies Fall. 4 credits. J. Reppy.

This course serves as an introduction to the study of war, peace, and peacemaking. We will study different theories of peace and war from a variety of disciplinary perspectives. The course will cover definitions of peace and war, causes of conflict, and modes of conflict prevention and resolution. The concepts will be applied to a range of historical and current conflicts. Students will prepare analyses of specific conflicts or instances of peacemaking for class presentation.

[GOVT 396 The Past as Prelude? (also History 352) 4 credits. Not offered 1995-96.]

[GOVT 398 North-South Relations 4 credits. Not offered 1995-96.]

[GOVT 399 International Relations of the Former Soviet Union Spring. 4 credits. A. Russo.

This will be a general introductory course in the foreign policy of the USSR and the Russian Federation since 1953, with particular emphasis on the post-communist era. We will examine the roles of ideology and perceptions, institutional politics, leadership, and reaction to challenges and opportunities in the outside world in an effort to come to grips with the rise and sudden collapse of the USSR as a global thermonuclear superpower. We shall then turn to the question of who makes Russian foreign policy and how Russia's rule in the outside world is being defined in relation to the former Soviet Republics, Europe, the Third World, and the developed West.

[GOVT 475 Topics in International Political Economy: Money and Finance 4 credits. Not offered 1995-96.]

[GOVT 482 International Relations of East Asia 4 credits. Not offered 1995-96.]


[GOVT 489 International Law and Regime Development 4 credits. Not offered 1995-96.]

[GOVT 491 Conflict, Cooperation, and Norm: Ethical Considerations in International Affairs 4 credits. Not offered 1995-96.]

Honors Courses

Each April a limited number of junior majors are admitted to the honors program, their work to begin the following fall. Application
forms and a full description of the program may be obtained in 125 McGraw Hall.

GOVT 494 Honors Seminar: Thesis Clarification and Research
Fall. 4 credits. R. Herrington
Each student works individually with a faculty member. The student initiates the tutorial by interesting a faculty member in his or her likely thesis project and by submitting to the director of undergraduate studies a form outlining the general area the thesis will treat and bearing the faculty tutor's signature. This form is due the third week of classes. The tutorial culminates in a ten-to-fifteen-page paper setting forth the central questions to be addressed by the thesis, the state of existing knowledge regarding those questions, and why they matter.

GOVT 495 Honors Thesis: Research and Writing
Spring. 4 credits. Limited to students who have successfully completed Government 494. Students continue the work of the preceding semester typically with the same faculty tutor. Research on the thesis is completed and writing begun. The tutorial culminates in a thesis of some sixty to eighty pages. The grade for the tutorial is determined by the faculty tutor, while the degree of honors (if any) awarded the thesis is decided by a committee of faculty members established for that purpose.

Independent Study
Independent study, Government 499, is a one-on-one tutorial which is arranged by the student with a faculty member of their choosing. Government 499 is open to government majors doing superior work, and it is the responsibility of the student to establish the research proposal and to find a faculty sponsor. Applicants for independent study must present a well-defined program of study that cannot be satisfied by pursuing courses in the regularly scheduled curriculum. No more than 4 credits of independent study may count toward fulfillment of the major. Students who elect to continue taking this course for more than one semester must select a new theme or subject each semester. Credit can be given only for work that results in a satisfactory writing. Emphasis is on the capacity to subject a body of related readings to analysis and criticism. Keep in mind that independent study cannot be used to fulfill the seminar requirement. The application form for Independent Study is available in 125 McGraw Hall and must be completed at the beginning of the semester in which the course is being taken.

GOVT 499 Readings Fall or Spring.
Fall or Spring. 1-4 credits.

Graduate Seminars
Qualified undergraduates are encouraged to apply for seminars listed with 600 course numbers but may only register with the permission of the instructor. Students may consult the supplement that lists graduate courses, available in the department office.

Field Seminars
GOVT 601 Scope and Methods of Political Analysis
Fall. 4 credits. W. Mebane
This course introduces the major analytical approaches used in contemporary political science research. We touch on broad philosophical issues concerning the nature of theory and inference, the practices of cultural and historical interpretation, and the relevance of moral values and political commitments. Several kinds of research designs, including comparative case study and quasi-experimentation, are briefly examined. The basic analytical ideas involved in statistical methods such as sampling and regression analysis are introduced, as are the basic concepts of the theory of collective choice and the elementary methods of applied game theory.

GOVT 602 Field Seminar in Political Methodology
Spring. 4 credits. J. Cowden.
This course introduces the quantitative methods most often used in contemporary political science research. We cover applied sampling and basic survey design, categorical data analysis, and basic regression analysis. The statistical methods are treated in conjunction with the problems of research design that most commonly arise in political science applications. Attention is given to the conventions accepted in political science for how a statistical analysis should be conducted and the results interpreted. A good basic course in probability and statistics is desirable, though not necessary, for preparation. Enrollment by interested undergraduates is encouraged.

GOVT 603 Field Seminar in American Politics
Fall. 4 credits. E. Sanders.
The basic issues and institutions of American government and the various subfields of American politics are introduced. The focus is on substantive information and theoretical analysis and problems of teaching and research.

GOVT 605 Field Seminar in Comparative Politics
Spring. 4 credits. J. Pontusson and S. Tarrow.
An introduction to selected theoretical problems in the study of comparative politics and to the application in empirical analysis. Basic problems are social class and politics, authority and legitimacy, participation and mobilization, economic development and democracy, authoritarian and totalitarian politics, corporatism and pluralism, and nation building and political integration.

GOVT 606 Field Seminar in International Relations
Fall. 4 credits. T. Christensen.
A general survey of the literature and propositions of the international relations field. Criteria are developed for judging theoretical propositions and are applied to the major findings. Participants will be expected to do extensive reading in the literature as well as research.

GOVT 607 The Western Political Tradition: A Survey
Fall. 4 credits. I. Kramnick.
An introduction to political theory through a reading of selected classics in political thought from Plato to Marx.

GOVT 608 Normative and Interpretive Methodologies

American Government and Institutions
GOVT 610 Formal Theory and Modelling
Fall. 4 credits. A. Rutten.
This course surveys the social choice and game theoretic branches of positive political theory. The topics covered include the theorems of Arrow, Schofield, and Gibbard-Satterthwaite, backwards induction, Nash and perfect equilibria, and repeated games and their applications to politics.

GOVT 611 The Political Economy of American Development, 1860-1900
Fall. 4 credits. R. Benessel.
This course will trace and describe the political economy of national state formation from the last decades of the antebellum period, through the Civil War and Reconstruction eras, and end with the transition to a more industrial society during the late nineteenth and early twentieth centuries. Utilizing a broad survey of the historical literature on these periods, the course will investigate: (1) the connection between slavery and the emergence of southern separatism; (2) the impact of conflict between the plantation South and industrializing North on American state formation; (3) the failure of post-Civil War attempts to remold the southern political economy; (4) the role of finance capital markets in industrial and western agrarian expansion; and the emergence of monetary issues in national politics; and (5) the political economic basis of possible developmental trajectories other than the high tariff, gold-standard one actually followed.

GOVT 612 American Political Development I: Social Movements and State Expansion in the Twentieth Century
Spring. 4 credits. E. Sanders.
Focus will be on the interaction of social movements and state policy from the progressive era through the 1980s. The assumption is that social movements have been the prime stimuli of national state expansion, although the form and content of the new policy were seldom completely satisfactory to the social movement organizations. Readings will deal both with movement organization and goals, and federal policy processes and outcomes.

GOVT 613 Politics and Economics in Local Areas

GOVT 615 State and Economy in Comparative Perspective
Spring. 4 credits. E. Sanders.
This course reviews the extensive literature on the political economy of comparative state formation and institutional change. Among the topics covered will be war-making and state expansion, regime evolution and economic development, and market processes and class transformations. Although much of the reading and discussion will focus on the United States and Europe, the limits of these cases as theoretical prototypes for the remainder of the world will also be considered.

GOVT 616 Feminist Jurisprudence

GOVT 619 Social Movements, the State, and Public Policy

GOVT 620 The United States Congress
**GOVT 622** The Political Economy of American Development  

**GOVT 623** The Politics of Courts  
Spring. 4 credits. J. Rabkin.  
All modern or westernized governments have judicial organs, designed to provide impartial decisions on certain kinds of disputes. But the kinds of issues that are left to courts vary widely from country to country and from era to era; the forms and degrees of political insulation for courts also vary widely, even the official rationales for such institutions vary a good deal. All of these differences are sometimes subjects of political controversy. This course will survey various forms and doctrines of judicial authority, seeking to clarify the relation between particular judicial models and the political systems in which they operate. Supra-national courts and administrative organs will be included in the survey. But principal emphasis will be on the role of courts in English-speaking countries.

**GOVT 624** American Political Organizations, Institutions, and Party Systems  
Spring. 4 credits. E. W. Kelley.  
This seminar analyzes the forces shaping the character and behavior of the interest groups, social movements, and governing coalitions organized by political leaders in the United States since the New Deal.

**GOVT 629** Cleavages and Coalitions in Contemporary American Politics  
Spring. 4 credits. M. Shefter.  
This seminar analyzes the emergence of new issues and political conflicts in recent American politics. It also considers efforts by these forces to establish political coalitions and will discuss the implications of these developments for the American party system.

**GOVT 706** The Politics of Education  
Fall. 4 credits. E. W. Kelley.  
See Govt 406 for description.

**Public Policy**  

**GOVT 626** Workshop on Law, Science and Technology (also S&T 626)  

**Comparative Government**  

**GOVT 633** European Party Systems and Political Change  

**GOVT 639** Studying Political Culture  
Fall. 4 credits. V. Shue and B. Anderson.  
Selected readings deploying a range of differing approaches to the study of the relations between culture and politics. Discussion of central methodological and interpretative issues including the linkage of cultural with structural explanations and the framing of informative comparisons across cultures. Readings and discussion focused on, but not confined to, Asian examples.

**GOVT 644** Sociotechnical Aspects of Irrigation  
For description, see AG EC 754. Not offered 1995-96.

**GOVT 645** Chinese Politics  
Spring. 4 credits. V. Shue.  
Review and assessment of several of the major currently competing approaches to the study of Chinese politics. Discussion and evaluation of leading works in the field analyzing Chinese state and society, policymaking and policy implementation, bureaucratic politics, elite political culture, and political economy. Special attention to problems of research and interpretation.

**GOVT 647** Political Anthropology: Southeast Asia  

**GOVT 648** Economic Policy of Change: Rural Development in the Third World  
Spring. 4 credits. R. Herring.  
The seminar analyzes strategies for economic, social, and political change using an approach that integrates economic, social, and political factors into a common framework dealing with policy choices and political action. Attention focuses particularly on developing local capacities for initiative and implementation with broader participation from rural communities.

**GOVT 649** Agrarian Political Economy: Land, Labor, and Nature  

**GOVT 652** Southeast Asia Seminar: The Philippines (also Asian Studies 601)  

**GOVT 653** The Plural Society Revisited (also Asian Studies 607)  

**GOVT 655** Women, Politics, and Policies in Europe  
Spring. 4 credits. U. Liebert.  
This course deals with movements, interest organizations, lobbies, political parties, and legislation related to women in the major European countries. Special attention will be given to the impact of women's collective action on reform.

**GOVT 656** Comparative Political Economy  
Fall. 4 credits. J. Pontusson and R. Bullock.  
This seminar seeks to specify the issues and analytical premises of comparative political economy as a subfield of political science. It explores the theoretical debates among political scientists doing political economy as well as the relationship of this literature to institutional economics and Marxist political economy. The readings deal primarily with advanced capitalist countries, and special emphasis is placed on Western Europe.

**GOVT 657** Comparative Democratization  
Fall. 4 credits. V. Bunce and H. Schamis.  
This course will focus on the transition from authoritarian to liberal politics in Eastern Europe and in Latin America. Particular attention will be paid to Poland, Hungary, Russia as well as Argentina, Brazil, and the not-necessarily-transitional Mexico. During the course, we will also bring in a variety of other cases of recent democratization—in particular, Spain, Portugal, Italy, and Greece. Our focus will be equally divided between the empirics of these transitions and theoretical understandings of transitions to democracy.

**GOVT 660** Social Movements and Politics  
Fall. 4 credits. S. Tarrow.  
This is a research seminar on the relationships among politics, organized social movements, and periods of mass mobilization like those that swept through Western Europe and the U.S. in the 1960s and in Eastern and Central Europe today. The course begins with a theoretical introduction to major approaches to social movements and collective action, concentrating on the factors that induce masses of people to adopt disruptive forms of collective action. It moves from there to a historical section focusing on cycles of protest in the recent and not-so-recent past. It continues with case materials that illustrate a series of theoretical problems in the study of movements and collective action—particularly that of the relations between protest and reform. Students will write term papers on particular cycles of protest and reform.

**GOVT 692** The Administration of Agricultural and Rural Development  
For description, see INTAG 603.

**Political Theory**  

**GOVT 663** Political Theories of Power  
Spring. 4 credits. A. M. Smith.  
Through reading and discussion of theorists such as Lukes, Gramsci, Laclau and Mouffe, Nietzsche, Foucault, Connolly, Fraser, Butler, Biddy Martin, Renata Salecl, (Joan) Scott, (Jacqueline) Rose, and (Mike) Davis, we will explore the contemporary debates on the structure of power relations. Seminar themes will include: the definition of social agents' interests, hegemony, disciplinary regimes, subjectivity and resistance. Seminar participants should already have a basic familiarity with the treatment of power in the political theory tradition.

**GOVT 664** Contemporary Democratic Theory  

**GOVT 665** American Political Thought: From Madison to Malcolm X  
Spring. 4 credits. J. Kramnick.  
This seminar will trace developments and tendencies in American political thought from the eighteenth century to the present. It will examine individual thinkers, like Jefferson, Calhoun or Dewey, movements like Anti-Federalism, Social Darwinism and Progressivism, and themes of political culture like racism, sexism, class policies, and religion. The seminar will presume a basic familiarity with American history.

**GOVT 669** Modern Social Theory I  
Fall. 4 credits. S. Tarrow.  
Readings vary, but topics are drawn from the traditions of Marx, Weber, Durkheim, the Frankfurt School, and Freud. They include political economy, the transformation to "modernity," ideology, the legitimation of power, and social institutions as social constraints. The methods of critical theory, structuralism, poststructuralism, and feminism will be considered.

**GOVT 670** Modern Social Theory II  
[GOVT 671] Graduate Seminar in Feminist Political Theory

[GOVT 672] Theories and Policies of Feminist Issues

[GOVT 674] Theory and Practice of Nationalism
Spring. 4 credits. S. Buck-Morss and B. Anderson.

This course will be devoted to the comparative study of the rise and transformation of nationalism according to different theoretical and philosophical traditions. The relationship of nationalism to questions of race, gender, class, and time will also be discussed on the basis of both theoretical and empirical studies.

[GOVT 675] Gramsci and Cultural Politics
(also German Literature 685)

[GOVT 691] Normative Elements of International Relations
Spring. 4 credits. H. Shue.

We examine selected normative elements of international affairs, divided into three interlocking clusters. First are issues about conflict, including both low-intensity military intervention and nuclear weapons. Second are questions about cooperation, especially between rich nations and poor nations. Third are debates about the authority and status of the major players in the international system: individual persons, nation-states, and international regimes. Questions include: Is the retention by some nations of nuclear weapons morally justified? Is the world economy unjust? Should national governments be pressured to respect individual human rights?

Independent Study
This course is NOT open to undergraduates. Undergraduates wishing to conduct supervised study should register for Government 499.

[GOVT 799] Independent Study
Fall or spring. 4 credits.

Government 799 is a course of individualized readings and research for graduate students. Topics, readings, and writing requirements will be designed through consultation between the student and the instructor. Graduate students in government who are looking to use this as an option to fulfill their course requirements should check with their chairs to be certain that the program of study is acceptable for this purpose. Applications must be completed and signed by the instructor and by the chairs of their special committees. They are available from, and must be returned to, the graduate secretary in 125 McGraw Hall.

GREEK
See Department of Classics.

HEBREW
See Department of Near Eastern Studies.

HINDI-URDU
See Modern Languages and Linguistics.

HISTORY


The popularity of history among Cornell students is due to its usefulness as preparation for graduate, professional, or law school and for any career that requires critical thinking and good writing; the reputation of the faculty for scholarship, teaching, and advising; and most of all, the intrinsic interest of the discipline. A wide variety of introductory and advanced courses is offered. The department is particularly strong in ancient, medieval, and modern European history; in American, Latin American, and Asian history; and in the history of science.

The Major
To complete the history major, a student must fulfill the requirements listed below:

Entry requirement: completion of any two History courses excluding Freshman Writing Seminars.

1) Take history department courses totaling 40 credits and complete all these courses with a grade of C or better. (Courses taken for entry may count towards 40 credits.)

2) Of the courses totaling 40 credits, take a minimum of:
   a. 16 credits outside of American history
   b. 12 credits in history before 1800.

Courses used to fulfill Requirement (1) above may also fulfill Requirement (3), in respect both to (a) and (b) if applicable. A course in American history before 1800 may be used to fulfill Requirement (3b). A course before 1800 in a field other than American history can be used toward fulfillment of both Requirements (3a) and (3b).

3) Of the courses totaling 40 credits, take at least one 400-level seminar.

Honors
The history department offers an honors program for students who wish to research and write a thesis during their senior year. In addition to writing a thesis, honors students must maintain a 3.5 average in their history courses, take the Honors Proseminar (History 400) plus an additional 400-level seminar, preferably during their junior year, and complete 44 credit hours in history. During the second term of sophomore year or early in junior year, interested students should speak to a faculty member or faculty adviser about the honors program.

Before the beginning of senior year, the candidate presents in conversation or in writing a thesis proposal to an appropriate member of the faculty of history. The faculty member who approves the proposal ordinarily becomes the thesis supervisor. If for any reason it is necessary to change supervisors, this arrangement should be confirmed no later than the fourth week after the beginning of the candidate's senior year.

Honors candidates should register in History 401, Honors Research, with their supervisors. Any exceptions to this must be approved by
### Course Offerings

**Comparative history**
- History of science
- American history
- Latin American history
- African history
- Asian history
- Near Eastern history
- Ancient European history
- Medieval, Renaissance, and early modern European history
- Modern European history
- Honors and research courses

### Course Numbering System

100-level courses are very general introductory courses (like 151-152, 190-191) and freshman writing seminars. 200-249-level courses are similar to freshman writing seminars, except that there is greater emphasis on subject matter and less on writing. 250-299-level courses have no prerequisites and admit freshmen. They cover a relatively broad geographical area, period of time, or subject. 300-399-level courses may have specified prerequisites or deal with more-specialized subjects than do those numbered 250-299. Admission of freshmen varies from course to course and is indicated in the course descriptions.

### Comparative History

**HIST 274 Foodways: A Social History of Food and Eating #**

Fall. 4 credits. S. L. Kaplan. An interdisciplinary examination of the validity of the adage “man is what he eats.” Among the topics: food and nutrition, food and social structure, the politics of food control, food and modernization, taste making, and food in religion and literature. Cases will be drawn widely across space and time, from Pharaoh’s Egypt to the 1980s.

**HIST 360 Early Warfare, East and West #**

Spring. 4 credits. Not offered 1995–96. Next offered 1996–97. C. Peterson. A study of the principal modes of warfare found both in the East and the West from ancient times up to the eighteenth century. Tactical evolution and the impact of innovations are stressed, but attention is also paid to the general social and cultural background and the role of nonmilitary factors.

**HIST 370 Resistance and Adaptation: Native American Responses to the Conquest #**


**HIST 380 Social History of Western Technology #**


**HIST 393 Images of Humanity in Medieval China [also Asian Studies 393] #**


### History of Science

**HIST 281 Science in Western Civilization [also Science and Technology Studies 281] #**

Fall. 4 credits. History 281 is not a prerequisite to 282. P. R. Dear. This course aims to make comprehensible both to science majors and to students of the humanities the historical structure and development of modern science and to show science as a cultural phenomenon. Changing perceptions of nature and human knowledge from Greek Antiquity to the twentieth century form the framework for current Western views of the world, while the roots of the present-day dominance of “science” as a symbol of progress and modernity lie in an alliance between knowledge of nature and power over nature that took shape in the nineteenth century after a long period of emergence. 281 runs chronologically up to the death of Isaac Newton and focuses on the cultural traditions of Christian Europe and its selective appropriation of a Greek heritage.

**HIST 282 Science in Western Civilization [also Science and Technology Studies 282] #**

Spring. 4 credits. History 282 is not a prerequisite to 281 or 282. P. R. Dear. This course aims to make comprehensible both to science majors and to students of the humanities the historical structure and development of modern science and to show science as a cultural phenomenon.
perceptions of nature and human knowledge from Greek Antiquity to the twentieth century form the framework for current Western views of the world, while the roots of the present-day dominance of "science" as a symbol of progress and modernity lie in an alliance between knowledge of nature and power over nature that took shape in the nineteenth century after a long period of eclipse. This course covers the eighteenth, nineteenth, and early twentieth centuries.

HIST 287 Evolution (also Science and Technology Studies 287)
Fall. W. Provine.
For description, see BIO G 207.

[HIST 300 Social History of Western Technology]
Studies in the interaction between technological changes and social changes in Western Europe and America since the eighteenth century. Readings and lectures will deal both with instances of social transformation that accompanied technological changes and with the role of technology in social thought and cultural expression. Special attention to three periods: Britain during the Industrial Revolution, America in the nineteenth century, and America during the Vietnam War.

HIST 415 Seminar in the History of Biology (also BioEs 467, BioSoc 447, S&TS 447)
Fall. 4 credits. W. Provine.
For description, see BIO ES 467.

[HIST 465 Scientific Rhetoric in Historical Perspective (also Communication 465 and Science and Technology Studies 465)]
Exploration of the development of scientific discourse since the Scientific Revolution, with special emphasis on understanding the rhetorical purposes served by differing forms and techniques. Readings will include classics from Newton, Darwin, Einstein, and others, along with representative samples of more recent scientific communications. Students will prepare brief reports during the semester and a final term paper.

[HIST 680 Seminar in Historiographical Approaches to Science (also Science and Technology Studies 680,TE 447)]
Examines philosophical, sociological, and methodological dimensions of recent historiography of science.

HIST 682 Topics in the Scientific Revolution (also Science and Technology Studies 682)
Fall. 4 credits. P. R. Dear.
This is a graduate seminar devoted to investigation of recent scholarship and issues in sixteenth- and seventeenth-century European knowledge of nature. Students will be expected to produce a substantial paper focused on the study of primary source documents. The seminar will focus alternately on demographic, economic, and intellectual trends in selected areas, and examine major projects and sources of the history of science. Topics will include the credibility and social status of the academic environment; philosophy and court culture; the situated meaning of experiment.

American History

[HIST 101 Introduction to American History (also American Studies 101)]
A survey of U.S. history designed to introduce students to major themes and interpretations. History 101 traces the origins and evolution of the nation through 1865. Topics include Puritanism, the American Revolution, the Constitution, Jacksonian democracy, and the Civil War.

[HIST 102 Introduction to American History (also American Studies 102)]
A survey of U.S. history designed to introduce students to major themes and interpretations. Covers the period from the Civil War to the present. Topics include the Reconstruction, the Gilded Age, the world wars, the 1960s, Vietnam, and Watergate.

HIST 208 The Era of Franklin D. Roosevelt
Fall. 4 credits. Primarily for sophomores. Prerequisite: permission of instructor. R. Polenberg.
The impact of the Great Depression and World War II on American politics, law, and culture.

[HIST 209 Political History of Indians in the United States #]

HIST 213 Asian American History (also Asian American Studies 213)
Fall. 4 credits. G. Okimoto.
Comparative introductory history of Asian Indians, Chinese, Filipino, Japanese, and Koreans in the U.S. from about 1850 to World War II. Themes include U.S. expansion in the Pacific, Asian migrant labor in Hawaii and the American West, the anti-asian movement, and Asian resistance.

HIST 214 Seminar on American Foreign Policy

HIST 227 Historical Perspectives on Modern American Gender Roles (also Women's Studies 227)
Fall. 4 credits. Limited to 20 students. Permission of instructor required. Intended primarily for sophomores. M. B. Norton.
A reading and discussion course. The class will begin by examining gender roles in the United States in the 1990s, looking at a variety of sources such as popular magazines and contemporary commentaries. We will then move backwards in time in an attempt to uncover the roots of current attitudes. The students will help determine which topics the class will investigate in detail.

HIST 238 The Historical Development of Women as Professionals, 1800 to the Present (also American Studies 258, Women's Studies 245 and Human Development and Family Studies 258)
Spring. 3 credits. J. Brumberg.
For description, see HDPS 258.

[HIST 273 Women in American Society, Past and Present (also Women's Studies 273)]
A survey of women's experiences in America from the seventeenth century to the present. Among the topics to be discussed are women's familial roles, the changing nature of household work, the women's rights movement, employment of women outside the home, racial and ethnic differences in women's experiences, and contemporary feminism.

HIST 276 American Indian History, 1500–1850 #
Fall. 4 credits. D. Usner.
A survey of North American Indian history from the sixteenth century to the mid-nineteenth century. Relations between Indian nations and with European colonies will be explored. Different cultural groups and cross-cultural encounters will be compared, with emphasis on resistance and adaptation to European colonialism. The formative years of U.S. Indian policy and the experiences of Indian people through the removal era will receive close attention.

HIST 277 American Indian History since 1850
Spring. 4 credits. D. Usner.
A historical study of American Indians in the United States and Canada from the mid-nineteenth century to the present. The active and complex role played by Indian people in their responses to government policies and to socioeconomic changes will be emphasized. Challenges faced and initiatives taken by Indians will be traced from the early reservation years to the current era of self-determination. Cultural change and continuity within Indian communities will be closely examined.

[HIST 303 African-American Women in Slavery and Freedom (also Women's Studies 307)]
Historical exploration of African-American women from a sociopolitical perspective. Topics include women in Africa, slavery and freedom, sexuality, labor, the family, feminism, and racism.

HIST 304 American Culture in Historical Perspective, 1880–1980 (also Amer. St. 304)
Fall. 4 credits. M. Kammen.
An introduction to American Studies and the study of American culture. Emphasis upon relationships between mass culture, popular culture, and high culture; and on the question of American exceptionalism (distinctiveness). Special attention also to the situation of subcultures and regions, to the changing role of entertainment in relation to leisure, the media, ethnicity (pluralism), the decorative and popular arts.
[HIST 309 The U.S. and the Third World  
This course examines the development of American relations with Asia, Africa, Latin America, and the Middle East, with particular emphasis on the post-World War II period. Connections between domestic factors in the United States and American foreign policy will be emphasized.]

[HIST 311 The Structure of American Political History  
Examines the course of American politics from the eighteenth century to the Gilded Age, focusing on the development of American political culture, nature of decision making, popular and legislative voting behavior, and the role of interest groups, political parties, and political elites in shaping our political history.]

[HIST 312 The Structure of American Political History  
Examines the course of American politics from 1865 to the present, focusing on the nature of decision making, popular and legislative voting behavior, and the role of interest groups, political parties, and political elites in shaping our political history.]

[HIST 313 U.S. Foreign Relations, 1750-1912  
Fall. 4 credits. Open to freshmen with permission of instructor. W. LaFeber.  
Examines policy and policymakers from Benjamin Franklin to Woodrow Wilson. Emphasis is placed on domestic events that shaped foreign policy. In conjunction with Hist. 315, a special course for discussion and guided research will be offered.]

[HIST 314 History of American Foreign Policy, 1912 to the Present  
Spring. 4 credits. T. Borstellman.  
Students examine the emergence of the United States as a world power in the twentieth century. The course focuses on the domestic sources of foreign policy and the assumptions of the major policymakers (Wilson through Clinton). Important themes include the American response to a revolutionary world since 1912, the role of American racial views in the making of foreign policy, and the increasing by dominant role of the president in the making of U. S. foreign policy.]

[HIST 316 American Political Thought: From Madison to Malcolm X (also Government 366)  
Spring. 4 credits. I. Kramnick.  
For description, see GOVT 366.]

[HIST 318 American Constitutional Development  
Major issues in constitutional history. Topics include: the drafting of the Constitution; the Bill of Rights; the Marshall era; the crises caused by slavery and emancipation; the rise of substantive due process; Holmes, Brandeis, and freedom of speech; the Roosevelt "revolution"; civil liberties and civil rights in modern America; the right to privacy; the contemporary Supreme Court.]

[HIST 319 The Frontier in American Thought and Culture  
As a kind of place and a cluster of symbols, the West has deeply influenced ideology and intellectual life in the United States. Using fiction, art, popular culture, and social sciences as primary texts, this course examines how concepts about race and class, society and environment, national destiny and development were fused into various forms of a frontier mythology.]

[HIST 321 Colonial North America to 1763  
Fall. 4 credits. M. B. Norton.  
A survey of European settlement in North America and the Caribbean, emphasizing the interactions of Europeans, Indians, and Africans; economic development, gender relations, religious and political change; and the impact on the colonies of internal and external conflicts.]

[HIST 325 Age of the American Revolution 1763-1815  
Spring. 4 credits. M. B. Norton.  
An examination of the process by which the thirteen English colonies became an independent and united nation, with emphasis on political thought and practice, social and economic change, and cultural development. Attention will be paid to the impact of the American Revolution on women, Blacks, and Indians as well as on white males.]

[HIST 327 American Frontier History Before 1850  
An overview of European exploration and colonization in North America, life on different colonial-Indian frontiers, and territorial expansion by the United States. Topics include the ideological and material frameworks of expansionism, the political and social dimensions of interethic and imperial rivalry, and the formation of U.S. Indian and land policies. Themes of human migration, commercial development, and environmental change are emphasized.]

[HIST 328 American Frontier History: The West since 1850  
An examination of the American West, both as place and myth, from the mid-nineteenth century to the present. Conquest of Indian territories, class and ethnic struggles, frontier ideology, and western politics are among the topics. The course comparatively studies agricultural, mining, and other frontier societies. The role of government and science in transforming western environments is closely explored, toward an understanding of recent farm, energy, and other land-use policies in the West.]

[HIST 330 The Age of Jackson, 1815-1850 (also Amer. St. 330)  

[HIST 331 The American Civil War and Reconstruction 1865-1877 (also Amer. St. 331)  
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.]

[HIST 332 The Urbanization of American Society: 1860-1880 (also Amer. St. 332)  
America was born in the country and moved to the city. This course examines the transformation of America from a rural to a rapidly urbanizing society and culture, from the first European settlements to the era of the Civil War. It is also a history of the city itself, as a human community, and as a crucible of cultural contact and change.]

[HIST 333 The Urbanization of American Society: 1860-2000 (also Amer. St. 333)  
America was born in the country and moved to the city. This course examines the transformation of America from the urbanizing society and culture of the mid-nineteenth century to the thoroughly metropolitan nation of the present (and near future). It is also a history of the city itself, as a human community, a crucible of cultural contact and change, and a focus of public policy.]

[HIST 334 African-American History from Slavery to Freedom  
Introductory course on African-Americans from 1619 to 1865, with a focus on African slavery and its consequences for African-American freedom. Other topics may include African cultural heritage, the slave trade, religion, the family, and the black freedom struggle.]

[HIST 336 The American Ethos of Entrepreneurialism: Capitalism and Society in Developing America, 1607-1877 (also Amer. St. 336)  
An examination of American society in the context of capitalist development, and of capitalism as a social phenomenon. The transformation of pre-industrial colonies into an industrializing nation; the development of social classes; the emerging ethos of free enterprise.]

[HIST 337 Entrepreneurialism and Organization in the Age of the Corporation: Capitalism and Society in Modern America, 1840-2000 (also Amer. St. 337)  
Spring. 4 credits. S. Blumin.  
An examination of American society in the context of capitalist development and of capitalism as a social phenomenon. The rise of corporate capitalism; class, "mass"; and the ethos of enterprise in twentieth-century American society.]

[HIST 340 Recent American History, 1929-1960  
Topics include radicalism and reform in the New Deal; Franklin Roosevelt and World War II; the Holocaust and the atomic age; the Cold War and civil liberties; individualism and conformity in the 1950s.]
[HIST 341] Recent American History, 1960 to the Present
Topics include the Supreme Court and civil rights; Kennedy, Johnson, and social reform; the Vietnam War and Watergate; the Carter, Reagan, and Bush presidencies; and class, race, and ethnicity in modern America.

HIST 345 The Intellectual and Cultural Life of Nineteenth-Century Americans (also Amer. St. 345 and Religious Studies 345)
Fall. 4 credits. R. L. Moore.
Examination of the development of cultural and intellectual diversity in the United States. Particular emphasis will be placed on religious pluralism.

HIST 346 The Modernization of the American Mind (also Amer. St. 346)
Spring. 4 credits. R. L. Moore.
American thought and culture from 1890 to the present. Emphasis on the intellectual impact of major political and economic events and the adaptation of social ideas and values to new conditions.

HIST 359 American Families in Historical Perspective (also Amer. St. 359, HDFS 359 and Women's Studies 357)
Spring. 3 credits. Prerequisite: HDFS 150 or one 200-level social science or history course. S-U grades optional. Human ecology students must register for HDFS 359. Not offered 1995-96. J. Brumberg.
For description, see HDFS 359.

HIST 370 Resistance and Adaptation: Native American Responses to the Conquest

HIST 375 The African-American Workers, 1865-1910: The Rural and Urban Experience (also ILRCB 385)
3 credits. Prerequisite: juniors and seniors, or permission of instructor. Not offered 1995-96. N. Salvatore.
For description, see ILRCB 385.

HIST 376 The African-American Workers, 1910 to the Present: Race, Work, and the City
Not offered 1995-96. N. Salvatore.
For description, see ILRCB 386.

HIST 411 Undergraduate Seminar in American Political History

HIST 412 Undergraduate Seminar in Asian American History (also Asian American Studies 412)
Spring. 4 credits. G. Okihoro.
A reading and research seminar that will cover various topics in Asian American history.

HIST 414 Motivations of American Foreign Policy
Fall. 4 credits. Prerequisite: Permission of instructor. W. LaFeber.
Topic to be announced.

HIST 418 Undergraduate Seminar in the History of the American South

HIST 419 Seminar in American Social History (also American Studies 419)

HIST 421 Cultural Stratification in Historical Perspective
Spring. 4 credits. Prerequisite: permission of instructor. M. Kammen.
The emergence of popular, middlebrow, and mass culture, along with the discourse among cultural critics concerning all three in relation to traditional high culture. The underlying context will concern the changing uses of leisure in twentieth-century America and conflicting attitudes toward cultural taste-levels in a democratic society.

HIST 426 Undergraduate Seminar in Early American History (also Women's Studies 426)
Spring. 4 credits. M. B. Norton.

HIST 428 Undergraduate Seminar in American Frontier History

HIST 429 Undergraduate Seminar in Indians of Eastern North America
Fall. 4 credits. D. Usner.
A seminar examining the history of Native Americans in the eastern woodlands from colonial times to the present. The cultural and economic participation of Indians in the evolution of frontier societies will be examined. Major topics include fur-trade networks, political relations, removal, and the persistence of Indian communities in eastern states.

HIST 432 The City in History: Europe
Spring. 4 credits. Prerequisite: permission of instructor. S. Blumin.
Reading and discussion of significant interpretations of the rise, role, and character of cities in medieval and early modern Europe, and in modern Europe and America. Individual research projects.

HIST 440 Undergraduate Seminar in Recent American History
Fall. 4 credits. Prerequisite: permission of instructor. R. Polenberg.

HIST 442 Religion and Politics in American History: From J. Winthrop to R. Reed (also American Studies 442 and Religious Studies 442)
Fall. 4 credits. R. L. Moore.
This course is intended to provide a historical background for understanding contemporary debates about church/state controversy in American politics. Permission of the instructor is required to enroll.

HIST 458 Female Adolescence in Historical Perspective (also Women's Studies 458 and Human Development and Family Studies 417)
Spring. 3 credits. J. Brumberg.
For description, see HDFS 417.

HIST 484 Seminar in the History of American Labor: Race, Work, and the City (also ILRCB 304)
Fall. 4 credits. Open to juniors and seniors only with the permission of the instructor. N. Salvatore.
For description, see ILRCB 304.

HIST 486 Seminar on the 1960s
Spring. 4 credits. T. Bonselmann.
This course will explore the issues and developments of the most turbulent and significant decade in recent U.S. history. Major topics will include the civil rights movement, the Kennedy and Johnson administrations, the Vietnam War, the anti-war movement, the counterculture, the women's liberation movement, the media, and the Nixon administration. A substantial research paper will be required.

HIST 500 Undergraduate Research Seminar (also American Studies 500)
Fall and spring. 8 credits each term. J. Silbey and others.
Offered in Cornell-in-Washington Program. An intensive research and writing experience utilizing the extensive resources of Washington, D.C.

HIST 521 Seminar in American Cultural Studies (also American Studies 521)
Fall. 4 credits. M. Kammen.
The focus will be the relationship between government and culture in historical perspective. After three contextual sessions devoted to 19th-century background, we will mainly be concerned with the period from the 1930s to the 1960s. Several core sessions will be devoted to government as a patron of culture in other societies. A research paper is required.

HIST 608 African-American Women
A reading and discussion seminar focusing on the experiences of African-American women in nineteenth-century America, including the Caribbean. Topics include women and labor, abolitionism, women's rights, sexuality and race relations, education and racial uplift, black women's literature, marriage and family.

HIST 610 Afro-American Historiography
Reading and discussion course focusing on the way historians write and interpret the Black experience in America. Students will be concerned with individual historians, various schools of thought, and historical approaches.

HIST 613 Seminar on American Diplomatic History
Fall. 4 credits. T. Bonselmann.
A reading and research seminar in twentieth-century American diplomatic history, emphasizing the Cold War period. Discussion will focus on interpretive approaches to U.S. foreign policy and on U.S. relations with the Third World since 1945. A research paper is required.

HIST 617 Seminar in American Cultural History
A reading and research seminar covering selected topics in nineteenth-century America.
ARTS AND SCIENCES - 1995–1996

**HIST 618 Seminar in American Cultural History**
Spring. 4 credits. R. L. Moore.

**HIST 620 Seminar in American History**

**HIST 621 Graduate Seminar in American Indian History**
A reading and research seminar intended primarily for graduate students. Major works in historiography are discussed, emphasizing their relationship to social science methods and theories and to other areas of American history. A research paper is required.

**HIST 624 Graduate Seminar in American History**
Spr. 4 credits. D. Usner.
Major works in historiography are discussed, emphasizing their relationship to social science methods and theories and to other areas of American history. A research paper is required.

**HIST 626 Graduate Seminar in the History of American Women (also Women 631)**
A reading and research seminar intended primarily for graduate students. Major works in American women's history will be carefully scrutinized, and each student will prepare a lengthy research paper.

**HIST 627 Graduate Seminar in Early American History**

**HIST 633 Seminar in Nineteenth-Century American History**

**HIST 634 Seminar in Nineteenth-Century American History**
A research seminar intended primarily for graduate students exploring society, culture, and politics of the United States between 1815 and 1896.

**HIST 640 Graduate Seminar in Recent American History**

**HIST 683 Seminar in American Labor History**
Spring. For description, see ILRBC 783.

**HIST 710 Colloquium in American History**
Examination of the major approaches, periods, issues, and modes of interpreting American history. Readings include recent “classics” of American scholarship from diverse subfields and genres.

**Latin American History**

**HIST 295 Colonial Latin America @ #**
Fall. 4 credits. M. Roldan.
Survey of Latin America from the rise of pre-Columbian civilizations through the European conquest, the establishment of the Spanish and Portuguese colonial societies, imperial rivalries in the New World, the background of the independence movements, and the achievement of political independence.

**HIST 296 Latin America in the Modern Age @**
Spring. 4 credits. M. Roldan.
Survey of the Latin American nations from independence to the present. Major themes include the persistence of neocolonial economic and social institutions, the development of nationalist and populist politics, revolutionary movements of the twentieth century, and United States–Latin American relations.

**HIST 347 Agrarian Societies in Latin America @ #**
Spring. 4 credits. T. Holloway.
The development of rural patterns of wealth, status, and power, focusing on the role of country people in the larger society. Topics include disruption of the conquest, evolution from encomienda to hacienda, rise of plantation agriculture and export enclaves, decline of Indian communities, peasant protest, and land reform and development programs of the recent past.

**HIST 348 Contemporary Brazil @**
With some historical background, the course focuses on the twentieth century. Topics include the import-substituting growth model, contradictions leading to military rule 1964–1985, transition to competitive politics, debt, ecology, regional and social disparities. Some comparisons are made to other Latin American countries.

**HIST 370 Resistance and Adaptation: Native American Responses to the Conquest @ # #**

**HIST 424 Art and Politics in Twentieth-Century Latin America @ #**
This seminar will examine the intersection of art and politics in Latin America and the role of both in constructing culture, ideology, and national/personal identity from the period of the Mexican Revolution through the military dictatorships of the late twentieth century. Topics will include the Mexican muralists and the Revolution (but including Frida Kahlo) working class and immigrant culture in Argentina and the tango; samba as a vehicle for social and political protest in Brazil; the (re) construction of gender and political self in the writings of Latin American women in exile; and the inscription of violence on public spaces and private bodies through graffiti and torture in the late twentieth century.

**HIST 445 Prostitutes and Patriots: Urban Culture and the Construction of Citizenship in Latin America, 1880–1950 (also History 645)**
Spring. 4 credits. Prerequisite: History 295 and/or 296 suggested. Permission of instructor required. Enrollment limited to 15. M. Roldan.
The growth of industry and commerce in Latin American cities attracted migrants and European immigrants (many of them young women) in search of economic opportunity and freedom from the restrictions of rural society. The “invasion” of a once elite-dominated urban space by individuals of mixed ethnic or low status, and the rise of an industrial working class spurred debate about the rights and duties of “citizens” and the limits of participation in urban political and economic life. Ambivalence over the dangers and pleasures of urban culture were frequently expressed through the double trope of the prostitute/patriot—one symbolizing corruption and moral decadence and the other the empowerment of women.

**HIST 449 Race and Class in Latin American History**
Fall. 4 credits. Prerequisite: permission of instructor. T. Holloway.
This seminar focuses on ethnic interaction and class formation in the historical development of Latin American societies, examining the roles of Native Americans, Europeans, and Africans. Each unit will be approached as an analysis of the historical origins of contemporary patterns, and comparisons will be made among units, in a search for underlying and overarching themes.

**HIST 470 Violence, Nation, Myth: The Americas (1770–1840) (also English 464 and Society for Humanities 470)**
Fall. 4 credits. M. Roldan and S. Samuels.
Marcham Seminar. This course considers the concept of violence in two different cultural contexts (the United States and Latin America) and from a range of perspectives: historical, literary, theoretical, and political. A central assumption is that violence has played a critical role in shaping discourses about the nation, everyday life, individual identity, and citizenship in the Americas. To explore how violence has been deployed as a cultural, political, and literary strategy we will focus on a variety of historical moments and dramatics.

**HIST 475 Bandits, Deviants, and Rebels in Latin America @**
HIST 645 Prostitutes and Patriots: Urban Culture and the Construction of Citizenship in Latin America 1800-1950 (also History 445)
Spring. T. Holloway. 4 credits.
For description, see History 445.

HIST 649 Seminar in Latin American History
Spring. T. Holloway. 4 credits.

Asian History

[HIST 390 Southern African History @ #
Southern African history from foundations to union, or from the earliest human inhabitants to 1910. Major themes will include the peopling of southern Africa, interaction and trade among the San, Khoikhoi, and Bantu-speaking peoples, the arrival and expansion of Europeans, African state systems, and the economic transformation of the 1870s and 80s leading to the South African war and union.]

HIST 190 Introduction to Asian Civilizations @ #
Spring. 4 credits. D. Wyatt.
A textbook, readings from a variety of original sources in translation whenever feasible.

HIST 298 State, Society, and Culture in Modern Japan @
A survey of Japan from the mid-eighteenth century to the present, with special attention to changing configurations of institutional structure, knowledge, action, and conceptions of history. Japanese works in translation will be read and discussed in addition to secondary sources.

HIST 322 Warrior Government and Culture in Medieval Japan @
This course traces warrior institutions and culture from the period (794-1185) through the medieval ages. The story of warrior development opens a broad window into premodern society. Students will read a variety of original sources in translation as well as analytical essays. Preliminary consultation with the instructor is advised.

HIST 326 From Medieval to Early Modern Japan @

HIST 343 Gandhi and Nonviolence (offered jointly with Peace Studies and the South Asia Program)
Fall. 4 credits. V. Prashad.
The century ends in cynicism and anger as we frustrate ourselves more and more with the violence of Bosnia, Somalia, and Patterson (New Jersey). This course will attempt to reintroduce the Spring to our present and future through a close analysis of the ideas and works of Mohandas Karamchand Gandhi (1869-1948). We will study four important protests (South Africa in 1913, Khedive's Dynasty in 1918-19, Dandi march in 1930, and the Harian movement after 1932) as well as the impact of Gandhianism in the Civil Rights movement. The class will attempt to reconstruct a form of Gandhianism which is not anachronistic (the final project will be an elaboration of Gandhi's basic concepts (such as nonviolence, passive resistance, civilization, etc.) for the next century. Graduate students should sign up for this course through History 703. Lectures and discussion. A midterm exam, a final project, and a writing assignment during the term.

HIST 352 The Past as Prelude? Japan in Asia, Germany in Europe (also Government 396) @
As capitalist "late developers" that turned to fascism and militarism, were defeated and occupied by the Allies after World War II, and grew rapidly into affluent democracies in the postwar era, Germany and Japan have also both come to assume problematical positions of economic leadership among former enemies in Europe and Asia. By investigating, in parallel, the history and current circumstances of each nation's interaction with its neighbors, the course poses timely questions related to national identity, political and economic conflicts, and regionalism in changing international environments.

HIST 360 Early Warfare, East and West @
For description see Comparative History.

HIST 382 Empires and Imperiled States: South Asia (offered jointly with the South Asia Program)
Fall. 4 credits. V. Prashad.
Rather than learn South Asian history in a vacuum, this course will attempt to pose the problem of South Asia within a comparative perspective of modern world history. We will study the emergence of Imperialism through the creation of plantations and centralized economies in Europe as well as through the production of colonial regimes in Asia, Africa, and the Caribbean. The course will spend considerable time on anti-colonial movements and on the emergence of the concept of "Third World." Reading will focus on South Asia (except for Fanon and C. L. R. James) while the lectures will be comparative and theoretical. This class does not presuppose any knowledge of South Asia.

HIST 393 Images of Humanity in Medieval China (also Asian St. #)
J. R. McRae.
For description see Comparative History.

HIST 395 Southeast Asia to the Eighteenth Century @
Spring. 4 credits. D. Wyatt.
A survey of the earlier history of Southeast Asia, concentrating particularly on regional movements of economic, social, cultural, and political change and using, to the extent possible, readings in primary sources.

HIST 396 Southeast Asian History from the Eighteenth Century @
Spring. 4 credits. T. Shiraishi.
A survey of the modern history of Southeast Asia with special attention to the formation of modern states (colonial as well as national), changing economic and social structure, and consciousness. Primarily will be read in translation whenever feasible.

HIST 420 Japan in the Year 1000: The Tale of Genji in Historical Perspective @ #
The Tale of Genji is a classic of premodern Japanese literature that provides readers a broad view into Japan's courtly society at a time when many of the elements of Japan's classical tradition were taking form. Additional primary source readings and secondary sources provide insight into the countryside beyond the capital as well. Previous study of premodern Japan is advised.

HIST 448 Gender and Family in Classical Japan @
An inquiry into structures of family and gender from the eighth to the fourteenth centuries. Themes will include kinship and family, state formation, and gender construction in the premodern period, with a comparative perspective invited to enroll.
"Breadth" reading, primary source materials, and comparative reading placing Japan in an East Asian context will be assigned. Previous study of some aspect of premodern Japan is recommended.

[HIST 460 Seminar in Islamic History: Muhammad and the Rise of Islam (also Near Eastern Studies 418 and Religious Studies 418)] @ #
For description, see NES 418.

[HIST 466 The Taishōkai: A Japanese Epic as History and Literature (also Society for the Humanities 426)] @ #

[HIST 489 Undergraduate Seminar in Modern Japanese History] @
Spring. 4 credits. Prerequisites:History 298 or equivalent, and permission of instructor. Not offered 1995-96. Next offered 1997-98. J. V. Koschmann.

[HIST 492 Undergraduate Seminar in Medieval Chinese History] @ #
Spring. 4 credits. Prerequisite: History 293, 360, or permission of instructor. C. A. Peterson.

[HIST 493 Problems in Modern Chinese History (also History 683)] @
Fall. 4 credits. Prerequisite: History 294 or permission of instructor. S. Cochran.
Conflicting interpretations of Chinese history during the late imperial period and the first half of the twentieth century.

[HIST 494 The Japanese in Asia] @
Japanese perceptions of Asia and Japan's economic, cultural, and political relations with the countries of East and Southeast Asia since the nineteenth century.

[HIST 495 Japanese Kingship in Comparative Perspective: Premodern East Asia] @ #
Explores the premodern civilization of Japan from a variety of historical perspectives. Students will attend History 297 lectures and participate in a special weekly colloquium.

[HIST 499 Problems in Modern Chinese History (also History 684)] @
Spring. 4 credits. Prerequisite: History 294 or permission of instructor. S. Cochran.
This course gives each student an opportunity to select one research topic and work on it throughout the semester. Knowledge of Chinese is not required, but background in Chinese studies is needed.

[HIST 609 Modern Japanese Studies: The Formation of the Field in History and Literature (also Asian Studies 609)]

The course will provide both a historical introduction to and critical analysis of the constitution of modern Japan studies as a "field" of postwar academic inquiry. While reading texts particularly influential in the early and contemporary formation of the field, we will consider such questions as the domestic and international contexts in which Japanese studies has been institutionalized and maintained, and the relationship between "Japan" as object of area studies discourse and "Japan" as represented in American journalism, popular culture, and politics. Interdisciplinary and team-taught, the course will aim to introduce students to a range of methodologies and approaches developed in historical and critical works, problematizing assumptions in each case. Possibilities for cross-disciplinary research (along lines recently undertaken in areas such as feminist criticism and cultural studies, for example), will also be explored.

[HIST 691 Chinese Historiography and Source Materials]
Fall. 4 credits. Prerequisite: permission of instructor. C. Peterson.

[HIST 693 Problems in Modern Chinese History (also History 493)]
Fall. 4 credits. Prerequisite: permission of instructor. S. Cochran.
Conflicting interpretations of Chinese history during the late imperial period and the first half of the twentieth century.

[HIST 694 Problems in Modern Chinese History (also History 499)]
Spring. 4 credits. Prerequisite: permission of instructor. S. Cochran.

[HIST 695 Early Southeast Asia: Graduate Proseminar]
Fall. 4 credits. D. Wyatt.
Introduction to the history of Southeast Asia for graduate students. Students will be expected to attend the lectures and complete the readings for History 395, and they will meet separately as a group to further explore selected topics.

[HIST 696 Modern Southeast Asia: Graduate Proseminar]
Spring. 4 credits. T. Shiraiishi.
Introduction to the modern history of Southeast Asia for graduate students. Students will be expected to attend the lectures and complete the readings for History 395, and they will meet separately as a group to further explore selected topics.

[HIST 792 Seminar in Medieval Chinese History]
Spring. 4 credits. Prerequisite: permission of instructor. C. A. Peterson.

[HIST 795 Seminar in Modern Southeast Asian History]
Fall. 4 credits. Permission of the instructor. T. Shiraiishi.
The seminar topically examines nineteenth- and twentieth-century Southeast Asian history. Organizational meeting on Thursday, 2:30-4:00 in the first week. The most likely topic for 1995 will be War and Revolution in the 1940s.

[HIST 796 Seminar in Southeast Asian History]
Spring. 4 credits. Prerequisite: reading knowledge of relevant languages. D. Wyatt.


Near Eastern History

[HIST 248 Islamic History: 1258-1914 (also NES 258 and Religious Studies 258)] @
Spring. 3 credits. Not offered 1995-96.
For description, see NES 258.

[HIST 254 Islamic History: 600-1258 (also NES 257 and Religious Studies 257)] @
Fall. 3 credits. D. Powers.
For description, see NES 257.

[HIST 317 Politics and Culture in Late Medieval Central Asia and the Near East] @
For description, see NES 353.

[HIST 372 Introduction to Islamic Law (also HIST 652, NES 651, REL ST 350)] @
Not offered 1995-96.
For description, see NES 351.

[HIST 437 Sexuality, Society, and the State in the Near East (also NES 456, NES 657, HIST 657 and Women's Studies 455, Women's Studies 655)] @
Spring. 4 credits. Not offered 1995-96.
L. Peirce.
For description, see NES 456.

[HIST 446 Ottoman History, 1300-1923 (also NES 458)]
Fall. 4 credits. Not offered 1995-96.
L. Peirce.
For description, see NES 458.

[HIST 461 Seminar in Islamic History 600-750 (also History 671, Near Eastern Studies 451 and 650, and Religious Studies)]
Spring. 4 credits. D. Powers.
For description, see NES 451.

[HIST 671 Seminar in Islamic History (also History 461, Near Eastern Studies 451, and 650, and Religious Studies)]
Spring. 4 credits. D. Powers.
For description, see NES 451.

Ancient European History

[HIST 151 Introduction to Western Civilization] #
Fall. 4 credits. B. Strauss.

What is civilization? What is the West? An inquiry into human history from the first states in western Asia and Egypt (ca. 3000 B.C.) to the early modern era in Europe (ca. 1400-1600). The focus is on war, government, production and exchange, family, and religion.

B. Strauss.
A survey of Greece from the earliest times to the end of the Classical period in the late fourth century B.C. The course focuses on the Greek genius: its causes, its greatness, its defects, and its legacy. The Heroic Age, the city-state, ancient democracy, and the
intellectual ferment of the Greek Enlightenment are the main topics of study. Readings in translation from Homer, Aristophanes, Sophocles, Herodotus, Thucydides, Plato, Aristotle, and from the evidence of ancient inscriptions, coins, art, and architecture.


A survey of Rome from the founding of the Republic to the end of the Western Empire. The focus is on the Roman conquest of the Mediterranean world and on the cultural reconquests of Rome by the vanquished. Roman politics, peasant society, Imperialism, and propaganda are the major topics of the first half. The government of the Caesars, society during the Roman peace, and the fertile interaction of Romans, Jews, and Greeks that produced Christianity are the main topics of the second. Readings in translation include Cicero, Polybius, Livy, Tacitus, Plutarch, and Saint Augustine.


The nature of Athenian democracy, society, and culture in the "golden age" of Athens. The course will examine the influence of Athenian politics on the great tragedians of the age and the influence of tragedy on the Athenians' conception of their character and history. Readings from Herodotus, Thucydides, Aeschylus, Sophocles, Euripides, Aristophanes, Plato, Aristotle, and Plutarch.


A survey of medieval civilization from ca. 300 to ca. 1100 dealing with religious, intellectual, political, and economic developments in Western Europe.


A survey of medieval civilization from ca. 1100 to ca. 1400, dealing with political, economic, religious, and intellectual developments in Western Europe. Special attention will be paid to the interaction of different sources and to the historian's understanding of literature and its use as a primary source. Lectures and class discussions.

[HIST 284: The Age of Reform in Western Europe (1400-1600)] 4 credits. G. Sreenivasan.

An exploration of how to reform church and society in the fifteenth and sixteenth centuries. Major topics include the strengths and weaknesses of the medieval church, the theological controversies among Lutherans, Calvinists, Anabaptists, and Roman Catholics, the social foundations of reforming and dissenting movements, and the success and failure of Protestant and Catholic Reformations.

[HIST 286: State and Society in the Iron Age (1500-1600)] 4 credits. G. Sreenivasan.

A survey of the conflicts which convulsed the continent of Western Europe between 1560 and 1600, focusing on the French Wars of Religion, the Dutch Revolt, the Thirty Years War, and peasant uprisings in France and Germany. The course will examine the sources and outcomes of conflict, the role of religion in politics, and the social impact of warfare. Particular attention will be placed on the capabilities and limitations of different state structures in mobilizing resources, waging war, and repressing dissent.


This course will explore the crises of political, religious, and epistemological authority that plagued England in the sixteenth and seventeenth centuries. We will examine the political and cultural impact of the Protestant Reformation, the nature of Tudor despotism and Stuart absolutism, the construction of a rhetoric of political dissent around issues of sexuality and corruption, competing understandings of the social order and social control, the Puritan Revolution and the invention of liberalism. Emphasis is on close reading of contemporary sources, from autobiography and drama to political theory.


An exploration of intellectual, cultural, religious, and political developments in Italy from the crisis of the communes in the time of Dante and Marsilius, through the several stages of Italian humanism from Petrarch to Alberti to Pico, down to the generation of Machiavelli and Castiglione. The course will seek to problematize the notion of the "Renaissance" in the period's ambivalent attitudes toward history, learning, culture, language, and the role of intellectuals in politics and society. Emphasis will be placed on the close reading of primary sources and on issues of interpretation.


This course will present Machiavelli in a variety of historical and interpretive contexts: European and Italian politics in the early sixteenth century; the decline of the Florentine republic and the rise of the Medicean principate; Machiavelli's own career in government and his, and the republic's, crisis in 1512-13; the intellectual traditions of Renaissance humanism, political thought, and the revival of antiquity; vernacular literary currents and popular culture; and the remarkable generation of political figures, writers, and theorists with whom Machiavelli associated and corresponded. Emphasis will be placed on a close reading of the major works (including the letters, The Prince, the Discourses, Mandragola, and selections from The Art of War and the Florentine Histories, all in translation) and a critical examination, in the light of that reading, of some major modern interpretations of Machiavelli.
ARTS AND SCIENCES - 1995-1996

HIST 364 The Culture of the Renaissance II (also Comparative Literature 362 History of Art 351, Music 390, and English 325) #

HIST 365 Medieval Culture, 400-1150 (also Religious Studies 365) #

HIST 366 Medieval Culture, 1100-1300 #
Spring. 4 credits. Prerequisite: History 264 or permission of instructor. Not offered 1995-96. Next offered 1997-98. J. J. John. The origin and development of the universities will be studied as background for a consideration of the scholastic mentality and its influence on the art, literature, philosophy, science, script, and theology of the period. Readings from Abelard, Hugh of St. Victor, Bonaventure, Thomas Aquinas, Dante, and others.

HIST 368 Marriage and Sexuality in Medieval Europe # (also Wom St. 360)
Spring. 4 credits. P. Hyams. Few topics generate heat so readily as gender relations and sexuality. Behind the current controversies lie decisions made in the first Christian centuries, and firm ed in the course of the Middle Ages; these still affect all of us, believers and unbelievers alike. This course studies Western attempts to deal with the problem of sexuality up to about 1500. The class will first clarify the church's normative rules of law and theology. Armed with this framework, it will then turn to more specific topics, including homosexuality, prostitution, rape/abduction and sexuality in medieval literature. The goal is to be able to compare the ideal model with the reality, and to thus assess the product the medieval church passed on to Western culture and ourselves. No formal prerequisite, though some prior knowledge of medieval European history is desirable.

HIST 369 The History of Florence in the Time of the Republic, 1250-1530 #
Spring. 4 credits. Not offered 1995-96. Next offered 1997-98. 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 political, family, and historical ideas are considered in the context of the emergence and transformation of republican government.

HIST 374 War, Trade, and Empire, 1500-1815 #
Spring. 4 credits. D. Baugh. Maritime enterprise, imperial policy, and naval power in the age of expansion. The rise and decline of the Portuguese and Spanish empires are considered, but the emphasis is on English, French, and Dutch rivalry in the Atlantic and Caribbean.

HIST 377 Gender in Early Modern Europe (also Women's Studies) #
Spring. 4 credits. Enrollment limited to 30. Not offered 1995-96. Next offered 1996-97. R. Weil. An inquiry into how masculinity and femininity were defined in early modern Europe. Questions to be explored include: What purpose did gender distinctions serve in this particular society? To what extent were men and women able to shape and redefine the meaning of their gender? How was their ability to do so affected by such events as the Reformation and the French Revolution?

HIST 405 Population and History

HIST 407 The Construction and Critique of the Enlightenment Subject (also Society for Humanities 407)
Spring. 3 credits. H. Mah. For description, see S HUM 407.

HIST 408 Feudalism and Chivalry: Secular Culture in Medieval France, 1000-1300 #
Spring. 4 credits. No prerequisites; History 265 or 264 would help. Not offered 1995-96. Next offered 1997-98. P. Hyams. An upper-level seminar on the main currents of noble lay culture in France, which led European fashions in love, warfare, entertainment, and environment through most of the period. There will be heavy emphasis on contemporary sources (in English), including lively and complete readings from epic literature (the Song of Roland), lives, and chronicles.

HIST 409 Seminar on Work in Europe and America
Fall. 4 credits. S. Kaplan. For description see Comparative History.

HIST 422 Medieval Political Individualism (also Society for Humanities 402)
Fall. 3 credits. A. Boureau. For description, see S HUM 402.

HIST 427 Power and Society in Early Medieval Europe and Japan
Fall. 4 credits. Prerequisite: a course in medieval European or Japanese historical studies, or permission of instructor. Not offered 1995-96. Next offered 1997-98. P. Hyams and J. Piggott. This seminar will focus on structures, processes, and practices of society in early medieval Europe and Japan. It will provide a forum for discussion of the ways in which, in some very different societies, Europeans and Japanese handled power. We will also be interested in comparing historiographical methodologies employed and issues considered by historians of these societies.

The nature of power and authority and characteristic organizational practices, including kingship, land tenure, status systems, and religious and military structures; the formation of ideology through art, ritual, literature, and law; and various means of linking center and periphery in these societies will be topics for discussion.

HIST 436 Conflict Resolution in Medieval Europe #
Spring. 4 credits. P. Hyams. This seminar concentrates on a time (late 9th-13th centuries) when much of Europe lacked formal systems of justice, and so handled questions of social control quite largely by extra-legal means. Its subject is in one sense political history upside-down, as viewed by individuals rather than by their rulers. We examine ways in which anthropology and some recent approaches to law can assist the readings will be partly anthropology, partly translated medieval accounts of actual conflicts, with samples of recent interpretation. The topics covered should be of interest to law students and majors in anthropology and other modern social sciences.

HIST 447 Crusaders and Chroniclers (also NES 401) #
Fall. 4 credits. Not offered 1995-96. Next offered 1996-97. P. Hyams. An intensive reading seminar offering a natural progression from History 259 The Crusades. It will examine contemporary accounts of the crusading movement in English translation. The twin goals are to follow select themes of crusading history to a deeper level than History 259 and to study medieval historiography through whole chronicles and other primary sources.

HIST 451 Lord and Peasant in Europe: A Seminar in Social History #
Not offered 1995-96. S. L. Kaplan.

HIST 468 Undergraduate Seminar in Renaissance History #

HIST 481 The English Revolution #
Spring. 4 credits. Not offered 1995-96. Next offered 1996-97. R. Weil. Between 1640 and 1660, England experienced two decades of civil war and revolution and embarked on a fascinating series of attempts to reorganize political and religious life. Women and the lower classes emerged as actors on the political stage, radical religious sects flourished, and the nature of authority was questioned in both the family and the state. This course will explore the political, cultural, religious and social dimensions of the English Revolution, using mostly primary sources.
An inquiry into how the ruling class ruled, wisdom literature will all come under scrutiny with some engagement with primary sources. Focus is on historiography and methodology of the English Revolution and their critics. Distance, court culture, the social interpretations of "public" and "private," clientage and corruption, the construction of the relationship of central and local power, history a corpus of material that historians fruitfully study such texts. Bede's Saxon chronicle, and the ways in which historians might most extensively read, and participate in class discussion. HIST 224 The British Empire, ca. 1780-1960 Spring. 3 credits. D. A. Baugh. An examination of the interaction of the Imperial Russian military effort and Russian foreign policy. Examples will be taken from various periods ranging from the early Muscovite period to the First World War. Students will write 6 to 8 short papers, do extensive reading, and participate in class discussion. HIST 688 Licit and Illicit Violence in the Sixteenth and Seventeenth Centuries Spring. 4 credits. G. Sreenivasan. An inquiry into the varieties of violence in early modern Europe. We will examine both those forms of violence which the authorities prohibited (murder, rioting, tyranny, the feud) and those forms which they themselves employed (warfare, inquisition, execution). We will also examine less overt forms of violence which though 'merely' psychic (black magic) or even spurious (the myth of Jewish ritual murder) powerfully influenced the lives of everyday women and men. The central themes of the seminar are the technologies and legitimation of violence—how, why, against and for whom violence was justified and exercised. Modern European History HIST 152 Introduction to Western Civilization (1600 to the end of World War II) # Spring. 4 credits. I. Hull and R. Weil. This course is designed to introduce students to some of the main themes of European history from the fifteenth to the present. The lectures are organized around the problems of state-building and social order: how have European societies ordered and reproduced themselves? why did the modern state and modern civilization develop? how have a succession of political ideologies legitimized them? how have state and society responded to crisis and disruption? what balance has been struck between acquiescence and force, between law and violence, in upholding order? Readings emphasize primary works by figures such as Luther, Hobbes, Tocqueville, Marx, etc. HIST 210 The Russian Military Effort and Foreign Policy # Fall. 3 credits. W. Pintner. An examination of the interrelation of the Imperial Russian military effort and Russian foreign policy. Examples will be taken from various periods ranging from the early Muscovite period to the First World War. Students will write 6 to 8 short papers, do extensive reading, and participate in class discussion. HIST 229 A History of European Childhood # Fall. 4 credits. Not offered 1995–96. Semester/TBA. N. Karwan Cutting. Surveys the history of childhood in Europe from the mid-seventeenth century to the present. Comparisons are made across Western, Eastern, and Mediterranean European societies. The course delineates those cultural, demographic, religious, political, and economic factors that shaped childhood, both in periods of transition and in times of violent instability. Changing perceptions of childhood are treated in the context of, for example: religious conflict, urbanization, developments in science and technology, war, and occupation. (All readings are in English.)
existentialism, the development of the social sciences, psychoanalysis, the modern novel, structuralism, and poststructuralism. Readings include Weber, Freud, Heidegger, Sartre, Camus, Woolf, Foucault, and Derrida.

A systematic examination of the social structure, economic life, political organization, and collective mentalities of a society that embraced absolute monarchies and, brutally and irreversibly, began to age. France, in European perspective, from the wars of religion through the age of Voltaire.

An examination of the social, political, intellectual, and diplomatic history of the German states from the devastation of the Thirty Years' War, through absolutism, the bourgeois revolutions of 1848, and the struggle for unification, to the beginning of the modern industrial state.

[HIST 357 Survey of German History, 1648-1890 #] Fall. 4 credits. Open to freshmen with permission of instructor. I. Hull.
An examination of the origins, practices and immediate causes of the cataclysm, with special focus on the relations between the various countries' domestic politics and their foreign policies, the changing balance of power, economic rivalries, imperialism, the growth of nationalism, and the arms race. It ends by considering why the war was so long and destructive and why, afterwards, no one could put the pieces back together again.

For description see History of Science.

[HIST 362 European Cultural History, 1890 to the Present] Fall. 4 credits. Open to freshmen with permission of instructor. I. Hull.
The "German problem" is examined. Major topics include tensions caused by rapid industrialization and urbanization, and the rise of mass media and their effects on German society. This course will focus on problems of political contexts.

An analysis of the origins, practices and immediate causes of the cataclysm, with special focus on the relations between the various countries' domestic politics and their foreign policies, the changing balance of power, economic rivalries, imperialism, the growth of nationalism, and the arms race.

Pictures, printed on paper from wood blocks or metal plates, provided illiterates as well as literate men, women, and children with views of their world and their past, their leaders and their enemies, their lands and their manners. This course addresses how these images were manufactured and emphasizes the history of a little-known workforce, often anonymous and popular. Students will see a variety of analytical interpretations that contextualize the printed image as an historical document and suggest the range of approaches in recent historical literature. Drawing upon original sources in the Cornell University Library, topics include the dissemination of early printed pictures, representations of scholars, saints, and demons in Reformation prints, the printers of engraved images, the gendering of images in pictures and texts, the status and professional rivalries among engravers. Enlightenment illustrations, and political caricature during the French Revolution, as well as the over-arching problems of visual propaganda and censorship. French, German, and English printed pictures will be emphasized. All required readings are in English.

An investigation of the major developments in European politics between 1900 and the end of the Second World War. Emphasis on the rise and fall of democratic political systems and their alternatives. Topics include the reorientation of liberalism and socialism, the transforming effects of war and depression, the dynamics and diplomacy of fascism, the European response to the economic and ideological influence of America and the Soviet Union, the changes in Eastern Europe during the interwar years, and the interaction between politics and social structure.

A political and social history of Europe between the fall of fascism and the political crises of 1968. Emphasis on the comparative study of the elaboration of democratic institutions and ideologies. Topics include the origins and course of the Cold War in Western and Eastern Europe, Gaulism and Christian Democracy, the emergence of welfare states, liberal-democratic and Communist culture, the end of colonial empires in the West, opposition movements in Eastern Europe, and the general upheaval of 1968.

The major political developments in Europe between the upheavals of 1968 and the collapse of Communist regimes. Topics will include the effects of economic downturn in 1973–1974; the response to terrorism; regionalist movements; new ethnic minorities and their opponents; Socialist governments in southern Europe; the arrival of democracy in Spain, Portugal, and Southern Germany; and the dynamics of the European Community; the rise of Thatcherism; the war scare of the 1980s; and the final phase of the Cold War.

For description, see Comparative History.

The Revolution was nothing if not a mass event. Mass action played a critical part in shaping its course. The "re-invention" of France affected the population down to each village and demanded decisions from virtually every adult. This course will focus on the people as actors: their collective memory, their ideologies, their repertoire of interventions, the formation of a popular political culture. It will examine the encounters between the people (in their multiple incarnations) and the revolutionary elites who sought to articulate and appropriate the Revolution. A major theme will be the tension between the ambitions to achieve liberty and equality.

[HIST 407 Seminar on Work in Europe and America] Fall. 4 credits. S. L. Kaplan.
For description see Comparative History.

For description, see GOVT 435.


[HIST 462 Popular Culture in European History] Spring. 4 credits. S. L. Kaplan.
An examination of the origins, practices and meanings of popular culture in Europe from the Middle Ages to the era of the French Revolution. After considering the various ways in which "culture" and "popular"
can be construed, the seminar will focus on the specific manifestations of popular culture, its various languages and gestures, and its complex relations with the dominant/elite cultures.

Examines the development of major social groups throughout Russian history in the sixteenth and twentieth centuries and compares them to similar groups in other societies.

[HIST 467 Seminar in Modern European History] Spring. 4 credits. Permission of the instructor required. J. Weiss.
Topic for 1996: The Politics of the European Past. The course will investigate the role of historical memory and commemoration in contemporary European political history, with some attention to the American case, and considerable use of evidence from the cinema. How was public memory shaped by political conflict? How did events such as the French Revolution, Nazi genocide, and the antifascist Resistance become sites of the struggle to influence the present?


The "other Europe": language, culture, and nation among the minority peoples of Europe. A comparative investigation of the development of the cultural and historical identity of non-dominant European ethnic groups and their relation to the formation and policies of European national states: the Basques, the Welsh, the Catalans, the Bretons, the Occitans, the Gaelic Irish, the Faeroes, the Gypsies, the Romansh, and others. The course will combine historical, literary, and sociolinguistic approaches.

An inquiry into the historical origins of European (especially French) political, social, and economic thought, beginning in the 1680s, at the zenith of Louis XIV's absolutism, and culminating in the French Revolution a century later. Emphasis is on the relation of criticism and theory to actual social, economic, religious, and political conditions. An effort is made to assess the impact of enlightened thought on the eighteenth-century world and to weigh its implications for modern political discourse. Readings in translation from such authors as Bayle, Montesquieu, Voltaire, Rousseau, Diderot, and others as well as from modern scholarly and polemical literature.

A seminar course, focusing on political and social history. The main emphasis is on the two world wars and their role in British economic and imperial decline. The course also looks at some great personalities—Lloyd George, Churchill, and Bevin—and the major political and social transitions, taking departure from Edwardian era.


[HIST 490 Social and Cultural History of the Soviet Intelligentsia] Spring. 4 credits. Prerequisites: a course in Russian/Soviet history, literature, or politics, or consent of the instructor. B. Walker.
This seminar examines the formation and history of the Soviet educated elite, beginning with its origin in the pre-Revolutionary period. An emphasis of the course is on the social, institutional and economic foundations of pre-Revolutionary and Soviet intellectual activity; the course will also explore the written and oral traditions by means of which intelligentsia identity has been forged during this century.

The topic this semester will be the construction of history, memory, and identity, among German Jewish intellectuals in the period of the Weimar Republic. Concentrated readings of Franz Rosenweig, Walter Benjamin, Leo Strauss, and Ernst Kantorowicz, and possibly others according to student interest.

For description, see GER ST 635.


[HIST 672 Seminar in European Intellectual History] Fall. 4 credits. D. LaCapra.


[HIST 674 Graduate Seminar in German History, 1770-1918] Fall. 4 credits. I. Hull.
Topic for 1995: Law in German History. This course explores selected topics in the political, social, and cultural history of Germany from 1770 to 1918. Its purpose is to introduce graduate students to the history and historiography of modern Germany and to allow those with sufficient preparation to pursue directed research during the semester.

[HIST 675 After the Divide: German Critical Theory of the Seventies and Eighties (also German Literature 675 and German Studies 675)] 4 credits. Not offered 1995–96. P. Hohendahl.
For description, see GER ST 675.


Topic: Social hierarchies and social solidarity. Studies in the history of stratification since 1815.

[HIST 750 European History Colloquium] Fall and spring. 4 credits, each term. Kaplan, Strauss (fall); Dear, Weil (spring).
A research colloquium designed for European history graduate students. The colloquium will offer a forum for students to present papers and to discuss the work of visiting scholars.

Honors and Research Courses
Note: History 301–302 are not regular courses for which students may sign up at will. They are personal arrangements with an instructor and a particular student. Students must first gain the consent of a particular instructor to work with them.

[HIST 301 Supervised Reading] Fall or spring. 2 credits. Open only to upperclass students. Prerequisite: permission of instructor. Staff.

[HIST 302 Supervised Research] Fall or spring. 3 or 4 credits. Open only to upperclass students. Prerequisite: permission of instructor. Staff.

[HIST 400 Honors Proséminar] Spring. 4 credits. Limited to 15 students. For prospective honors candidates in history. Prerequisite: permission of a member of the Honors Committee is required to register. M. Kammen.
An examination of major approaches to historical inquiry and analysis. Masterworks of historical writing (traditional as well as recent) will be discussed. There will be one short essay and a longer paper (a study of the work of one major historian). The readings will be drawn from all time periods and diverse cultures.

[HIST 401 Honors Guidance] Fall or spring. 4 credits. Prerequisites: History 400 and permission of instructor. Staff.

[HIST 402 Honors Research] Fall or spring. 4 credits. Prerequisites: History 400 and permission of instructor. Staff.

[HIST 703-704 Supervised Reading] 703, fall; 704, spring. 4 credits each term. Limited to graduate students. Prerequisite: permission of instructor. Staff.

[HIST 709 Introduction to the Graduate Study of History] Fall. 4 credits. Required of all first-year graduate students. T. Holloway, R. Weil.
The course is designed to introduce entering graduate students to crucial issues and problems in historiography that cut across various areas of specialization.
ARTS AND SCIENCES - 1995-1996

HISTORY OF ART


The Department of the History of Art provides a broad range of introductory and advanced courses in Western (European and American) and non-Western art (particularly East and Southeast Asian), from ancient times to the present. Courses have various emphases: archaeology, artists, styles, themes, iconography (the study of subject matter), patronage, social history, and various methods. The department offerings reflect the interdisciplinary nature of the subject and the importance of critical theory in interpreting works of art. The resources of the Herbert F. Johnson Museum of Art frequently serve as the focus for discussion sections and paper assignments.

The Major

The major in history of art enables students to acquire a familiarity with the art of many different cultures and a deeper knowledge of selected periods and places. The major strengthens visual, analytical, and interpretive skills, and reading and writing abilities. The major requires that students develop breadth and depth, but it is also flexible enough to be tailored to each student's interests. In their junior and senior years, majors work closely with their advisers to determine their own course of study.

Admission to the Major

Students wishing to major in the history of art should complete two courses at Cornell in the department by the end of their sophomore year. One of the two courses required for entry into the major must concern material that deals predominantly with periods before 1900 AD or with non-Western art. These two courses are prerequisites for the major and may not be counted toward fulfillment of the major requirements. Prospective majors should consult with the director of undergraduate studies.

Requirements for the Major

The major in History of Art requires 36 credits, of which 30 must at the 300-level or higher.

Majors should acquire a broad familiarity with the history of art in several chronological and geographical areas (in Western art: ancient, medieval, Renaissance and baroque, and modern; and in non-Western art: Chinese, Japanese, Southeast Asia, or other areas that are occasionally taught in the department).

The department does not offer a sweeping survey of Western art, because such a course provides only a very superficial knowledge, but it encourages students to gain experience with several areas in the history of art. The major requires at least one course in an area from ancient through baroque art, one course in modern art, and one in non-Western art.

Majors must in addition develop a thorough knowledge of at least two and preferably three areas in the history of art. By studying them on progressively more advanced levels, students will also acquire facility with the tools and methods of the discipline of art history. The major requires two sequences of courses, each in a different area. A sequence is two courses in the same area, the second at a higher level than the first, as in a 200- and 300-level course or a 300- and 400-level course. One seminar (400- or 500-level course) is also required for the major.

Majors will acquire an understanding of different approaches in the history of art, such as connoisseurship and various methods informed by poststructuralist theories for the analysis of works of art. Majors are required to take the proseminar, which is a survey of methods and historiography, normally taken in the fall of their junior year. They are also encouraged to take at least one additional course that will develop their knowledge and skills in one method of the study of art (as in museum issues and dendrochronology) or their understanding of critical discourses (art criticism since the nineteenth century, psychoanalytic, marxist, feminist, and postmodern criticism).

The history of art is intrinsically interdisciplinary and various other disciplines are necessary complements for understanding works of art in their historical and cultural contexts. Therefore, majors are encouraged to take related courses in history of architecture, history, literature, critical theory, studio art, etc. Majors are also encouraged to study foreign languages related to their principal interests in art, particularly if they are considering graduate study. In addition to the 36 credits, the major also requires two courses in related areas, approved by the adviser, or two additional courses in the department.

Honeys

To become a candidate for the degree of Bachelor of Arts with honors in the history of art, a student must have a cumulative average of B+ for all courses taken in the department and a cumulative average of B in all arts and sciences courses. Application to write the honors thesis should be made to the director of undergraduate studies during the second term of the junior year. The application must include a summary of the proposed project, an endorsement by a faculty sponsor, and a copy of the student's transcript. In the senior year the honors candidate will include in his/her course load, History of Art 600 and 601. These courses address the research and writing of the senior thesis under the direction of the student's project adviser.

Course Numbering System

100-level courses are all freshman writing seminars.

200-level courses are introductions to the major subdivisions of Western and non-Western art and they often have large enrollments.

300-level courses are more specialized, and some have the introductory course in the appropriate area as a prerequisite. Freshmen are advised to take the introductory courses unless they already have substantial background in the history of art.

400-level courses are upper-level seminars, primarily for undergraduates, although graduate students in the history of art and other fields also take them.

500-level courses are primarily graduate seminars, which undergraduates may also take.

Freshman Writing Seminars

For Freshman Writing Seminar offerings in the History of Art, see the John S. Knight Writing Program's special brochure. These courses may be used as freshman electives but not to satisfy the distribution requirement.

Courses

History of Art Introductory Courses

200-level courses in the history of art have been changed. 220, 230, 245, and 260 will all be offered as 4-credit courses with required sections.

ART H 202 Survey of European Art: Renaissance to Modern #

Summer only. 3 credits. Staff.

The major traditions and movements in western European art from the Renaissance to the Modern period. Painting, sculpture, and architecture with an emphasis on painting.

ART H 220 Introduction to Art History: The Classical World (also Classics 220) #

Fall. 4 credits. Each student must enroll in a section. A Ramage.

An overview of the art and archaeology of the Greek and Roman world. The sculpture, vase painting, and architecture of the ancient Greeks from the Geometric period through the Hellenistic and the art of the Romans from the early Republic to the late empire.

ART H 221 Minoan-Mycenaean Art and Archaeology (also Classics 221 and Archaeology 221) #

Spring. 3 credits. J. Coleman.

The birth of civilization in Greece and the Aegean islands during the Bronze Age. The main focus is on the rise and fall of Minoan Crete and Mycenaean Greece, with consideration given to the nature and significance of Aegean interactions with Egypt, the Near East, and Anatolia.

[ART H 224 Archaeology in Action I (also Classics 232 and Archaeology 224) #]

3 credits. Prerequisite: permission of instructor. Not offered fall 1995-96. P. I. Kuniholm.]

[ART H 225 Archaeology in Action II (also Classics 233 and Archaeology 233) #]

3 credits. Prerequisite: permission of instructor. Not offered 1995-96. P. I. Kuniholm.]

ART H 230 Introduction to Art History: Monuments of Medieval Art (also Religious Studies 230) #

Spring. 4 credits. Each student must enroll in a section. R. G. Calkins. An introduction to the approaches to art history through a study of selected works of art from the Middle Ages: architecture, sculpture, painting, manuscript illumination, metalwork, and ivory.

ART H 245 Introduction to Art History: Renaissance and Baroque Art #

Fall. 4 credits. Each student must enroll in a section. K. Barzman. A survey of major works of European painting, sculpture, and architecture from 1400 to 1700. The focus is on preeminent artists, workshop methods, style, meaning, patronage, and the function of art in a range of social contexts. The course also covers the methods of art history currently practiced in Renaissance and Baroque studies.
ART H 260 Introduction to Art History: The Modern Era
Spring. 4 credits. Not open to students who have taken History of Art 261. Each student must enroll in a section.

J. F. Bernstock.
A discussion of the most important developments in art from 1780 to the present. The emphasis is on major movements and artists such as Romanticism (Delacroix), Realism (Courbet), Impressionism (Monet), Post-Impressionism (van Gogh), Cubism (Picasso), Fauvism (Matisse), Surrealism (Miro), Abstract Expressionism (Pollock), and Pop Art (Warhol).

ART H 261 Introduction to Art History: Modern Art
Summer only. 3 credits. Staff.
An introduction to early modern art as it developed between the French Revolution and World War I. Both European and American movements are examined, including Romanticism, Impressionism, and Cubism. Units are organized around central figures such as Mary Cassatt, Edgar Degas, Thomas Eakins, and Vincent van Gogh. Lectures are supplemented with discussions of methods of inquiry, including social history and feminism, fundamental to interpreting works of art.

ART H 260 Introduction to Art History: Approaches to Asian Art #
Fall. 3 credits. S. J. O'Connor.
Designed to introduce students to the varied responses of the Asian artist in different social and geographical contexts. By selective focus and emphasis rather than broad survey, the student will gain some familiarity with the Japanese shadow-puppet theater, 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.

ART H 309 Dendrochronology of the Aegean (also Classics 309) and Archaeology (also Classics 308)
Spring. 4 credits. Prerequisite: permission of instructor. Limited to 10 students. P. I. Kuniholm.
Participation in a research project of dating modern and ancient tree-ring samples from the Aegean and Mediterranean. Supervised residential laboratory work. A possibility exists for summer fieldwork in Greece or Turkey.

ART H 320 The Archaeology of Classical Greece (also Classics 320) #
Fall. 4 credits. Not offered 1995–96.
A. Ramage.

ART H 322 Arts of the Roman Empire (also Classics 350) #
Spring. 4 credits. A. Ramage.
The visual arts in the service of the first world state. The course starts with the architecture, painting, and sculpture of the Etruscan and Republican period but concentrates on monuments of the Imperial era in Italy and the provinces until the time of Constantine. Art made for private patrons is considered, along with the official presentations of the emperors.

ART H 323 Painting in the Greek and Roman World (also Classics 323) #
A. Ramage.

ART H 325 Greek Vase Painting (also Classics 325) #
A. Ramage.

ART H 326 Greek Cities and Towns (also Classics 326) #
4 credits. Prerequisite: Classics/History of Art 220 or permission of instructor. Not offered 1995–96. J. Coleman.

ART H 327 Greek and Roman Coins (also Classics 327) #
A. Ramage.

ART H 328 Greeks and Their Neighbors (also Classics 328) #
A. Ramage.

ART H 329 Greek Sculpture (also Classics 329) #

ART H 332 Architecture in the Middle Ages (also Architecture 382, Religious Studies 332) #
R. G. Calkins.

ART H 333 Early Medieval Art and Architecture #
R. G. Calkins.

ART H 334 Romanesque Art and Architecture #
Spring. 4 credits. R. G. Calkins.
The painting, manuscript illumination, sculpture, and architecture of the eleventh and twelfth centuries, primarily in France, England, and Spain. Particular attention will be paid to the art of the Pilgrimage Roads, the manifestation of specific regional styles, the problems of Byzantine influence, the significance of the art of the church treasuries, and the factors that brought about the transition to the early Gothic.

ART H 335 Gothic Art and Architecture (also Religious Studies 335) #
R. G. Calkins.

ART H 336 Prelude to the Italian Renaissance (also Religious Studies 336) #
R. G. Calkins.

ART H 337 The Medieval Illuminated Book (also Religious Studies 337) #
Fall. 4 credits. R. G. Calkins.
A study of selected major examples of medieval illuminated manuscripts from between A.D. 300 and 1500. Facsimiles of major manuscripts such as the Lindisfarne Gospels, the Book of Kells, and the Hours of Mary of Burgundy will be examined. Students will write a research paper on a manuscript of their choice.

ART H 341 Flemish Painting #
R. G. Calkins.

ART H 342 Medieval and Renaissance German Art #
R. G. Calkins.

ART H 343 Italian Renaissance of the Fifteenth Century #
C. Lazzaro.

ART H 344 Italian Renaissance of the Sixteenth Century (also History 361 and Comparative Literature 361) #

ART H 345 Rome, Florence, and Venice in the Sixteenth Century #
C. Lazzaro.

ART H 348 Renaissance Art in Northern Europe: The Sixteenth Century #

ART H 350 The Culture of the Renaissance I (also History 361 and Comparative Literature 361) #
Spring. 4 credits. Each student must enroll in a section. C. Lazzaro, J. M. Najemy.
An interdisciplinary exploration of some major themes of Renaissance society and culture from the fourteenth to the sixteenth centuries. Utilizing the perspectives of history, art, history, and literature, the course will investigate the representation in primary texts and works of art with the aid of selected modern criticism of Renaissance discourses of antiquity and authority, education and learning, religion and lay culture, politics, gender and family, love and eros, and cross-cultural encounters. Most of the attention will be to Italian history and culture, but with some comparisons to other European contexts. Readings include selections from Petrarch, Boccaccio, Alberti, Machiavelli, More, Erasmus, and Vasari. Artists range from Ambrogio Lorenzetti to Mantegna, Dürer, Titian, and others. Two lectures and a required discussion section each week.

ART H 352 The Culture of the Renaissance II (also Comparative Literature 362, English 325, and History 364) #

ART H 355 Art as Spectacle: The Italian Baroque (also Religious Studies 352) #
K. Barzman.
This course casts the Italian Baroque as a society of spectacle. Lectures and discussions will focus on frescoes, public sculpture, architecture, and the re-organization of urban space in Italian cities from the end of the Council of Trent (1563) through the papacy of Clement XII (1740). Emphasis will be placed on spectacular display, on the forms of address intended to guide and impress the viewer, and on the various institutions and individuals served by this kind of cultural production. Artiss covered include Bernini, Borromini, Caravaggio, Carracci, Gaulli, and Tiepolo.

ART H 360 Painting and Everyday Life in Nineteenth-Century America (also American Studies 360) #
Fall. 4 credits. L. L. Melner.
Nineteenth-century American paintings were constructed to project an image of "exceptionalism," DeTocqueville's term for the social harmony and material abundance he considered unique to the New World. Embedded in these icons of national cohesion, however, were signs of race, class, and political conflict that we will decode through interdisciplinary methods. Our topic units include New England portraiture
and the merchant economy, Hudson River landscape and corporate (railroad) patronage, images of African Americans and Reconstruction, images of Native Americans, the West, and Manifest Destiny. Through these, we will challenge the assumption that American art celebrated democracy, and instead consider more complex realities. Our key artists include John S. Copley, George Caleb Bingham, Winslow Homer, Lily Martin Spencer, Mary Cassatt, Thomas Eakins. Blending the form and content of democratic aesthetics, our readings include art historical texts and others by Poe, Emerson, and Whitman.


ART H 362 Impressionism and Society Spring 4 credits. L. L. Meixner. This course discusses French Impressionism as it relates to nineteenth-century public life. Chief artists include Manet, Cassatt, Morisot, Degas, Pissarro, Monet, Seurat, Toulouse-Lautrec, and Van Gogh. Images are interpreted as cultural products of the Third Republic, with close attention to café and brothel society, middle-class leisure, *japonisme* and imperialism, workers' movements, and Le Bon's theory of crowds. Woven into historical discussions are more theoretical considerations of utopia, capital, pathology, and the public body. Overarching issues of class, gender, and power in urban Paris will be addressed through the writings of Baudelaire, Benjamin, Pollock, Jameson, and Zola.


ART H 366 Problems in Modernism: "Primitivism" Fall 4 credits. H. Foster. This course examines the different appropriations of "the primitive" in modern and postmodern art, literature, and theory. After a brief survey of Orientalism and *japonisme*, we will focus on the various valuations given "the primitive" in art from Joseph Conrad and Paul Gauguin to postcolonial discourse in the present. In this way "primitive" art will not be our subject so much as its role in the transformation of modern art and in the construction of modern identity.

[ART H 367 Problems in Modernism: "High" and "Low" Culture (also Comparative Literature 368) 4 credits. Not offered 1995-96. H. Foster.]


ART H 371 Architectural History of Washington, D.C. Fall or spring. Variable credit. Only for students in the Comell-in-Washington program. Only for non-architects. P. Scott. A historical and critical survey of the architecture of Washington. Attention will be given to the periods, styles, architects, and clients—public and private—of the notable buildings and to the urbancape of the nation's capital. The vocabulary of architectural analysis and criticism will be taught. Field trips required.

ART H 380 Introduction to the Arts of China 4 credits. M. W. Young. A one semester introduction to the arts of China, this course will examine the visual arts of the world's oldest continuous civilization in a topic rather than strict chronological framework. The lectures will cover the major contribution the Chinese have made in the area of ritual bronzes, burial art, Buddhist sculpture, pottery and porcelain, calligraphy and painting. A substantive part of the course will be devoted to the development of landscape painting, particularly in the later centuries of Chinese art. Sections for the course will meet in the Johnson Museum to examine original works from the museum's large Chinese collection.


[ART H 385 Chinese Painting 4 credits. Not offered 1995-96.]


ART H 391 From Sufi Poet to Muslim Saint (also Near Eastern Studies 352) Fall. 4 credits. E. S. Wolper. For description, see NES 352.


Seminars Courses at the 400 and 500 level are open to upperclass students, majors, and graduate students. All seminars involve the writing and presentation of research papers. Enrollment is limited to 15 students, and permission of the instructor is required. Students may repeat courses that cover a different topic each semester.

ART H 400 Proseminar for Art History Majors: The History and Practice of Art History Fall 4 credits. Prerequisite: History of Art majors only. Enrollment is limited. Limited to majors in the department, this seminar focuses on methods and historiography. We will consider the various practices of art history employed over the years in the analysis and interpretation of cultural production. Readings will focus on classic texts and major authors responsible for codifying these approaches. Papers will call upon students to test methods into practice and to think critically about the writing of art history.

ART H 401 Independent Study Fall or spring. 2-4 credits. May be repeated for credit. Prerequisite: permission of a department faculty member.

Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.

ART H 402 Independent Study Fall or spring. 2-4 credits. May be repeated for credit. Prerequisite: permission of a department faculty member.

Individual investigation and discussion of special topics not covered in the regular course offerings, by arrangement with a member of the department.

ART H 407 Seminar on Museum Issues Fall. 4 credits. Prerequisite: permission of instructor. Limited enrollment. All classes will meet in the Johnson Art Museum Study Gallery, M. W. Young and museum staff.

This undergraduate seminar will utilize the resources of the Johnson Art Museum and is designed to give students with a strong art history background the opportunity to work closely and directly with objects from the museum's major collections. The course will focus on the broad issue of art and connoisseurship and will address critically the question of what determines quality in the work of art. Topics to be covered in the weekly sessions will include methods of attribution, fakes and forgeries, technique and media, restoration and conservation. Some sessions will involve curatorial staff of the museum. Frequent reports and a significant final paper will be expected of all participants. Enrollment is limited, and permission of the instructor is necessary before the first meeting. Students interested in this course should indicate so by notifying the department directly at the time of pre-registration.

ART H 423 Ceramics (also Classics 423 and Archaeology 423) Spring. 4 credits. Prerequisite: permission of instructor. J. Coleman. Bronze Age, Greek, and Roman pottery specimens from Near Eastern and Mediterranean sites will be studied to provide direct experience in one of the basic prerequisites of archaeological excavation—the identification and dating of pottery types. Reports, delivered in class, will concern ancient ceramic materials or particular types and periods. Practical experience in making and decorating pottery will be encouraged.

ART H 424 Sardis and the Cities of Asia Minor (also Archaeology 432 and Classics 432) 4 credits. Not offered 1995-96. A. Ramage.


ART H 427 Seminar on Roman Art and Archaeology (also Classics 435) 4 credits. Prerequisite: permission of instructor. Not offered 1995-96. A. Ramage.

ART H 434 The Rise of Classical Greece (also Classics 434) 4 credits. Recommended: Classics 220 or History of Art 220, Classics 221 or History of Art 221, or permission of instructor. Not offered 1995-96. P. J. Kuniholm.
This course will examine various objects of medieval origin, metalwork, ivories, sculpture, paintings and perhaps manuscripts in various Washington Area Collections. For the most part, classes will be held at Dumbarton Oaks, the National Gallery, the National Cathedral, and the Walters Art Gallery in Baltimore. Each class will be organized around some theme best represented by the available objects at each location.

[ART H 441 Medieval Art in Washington Collection
Fall. 4 credits. Only for students in the Cornell-in-Washington program.
R. G. Calkins]

This course will examine various objects of medieval origin, metalwork, ivories, sculpture, paintings and perhaps manuscripts in various Washington Area Collections. For the most part, classes will be held at Dumbarton Oaks, the National Gallery, the National Cathedral, and the Walters Art Gallery in Baltimore. Each class will be organized around some theme best represented by the available objects at each location.

[ART H 448 Studies in Sixteenth-Century European Art #
4 credits. Prerequisite: permission of instructor. Not offered 1995–96.
C. Lazzaro]

[ART H 450 Women in Italian Renaissance Art (also Women's Studies 451) #
4 credits. Prerequisite: permission of instructor. Not offered 1995–96.
C. Lazzaro]

[ART H 456 Seminar in Baroque Art #
4 credits. Prerequisite: permission of instructor. Not offered 1995–96.
K. Barzman]

[ART H 461 Fin-de-siècle Cultures in Europe, England, and America #
4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not offered 1995–96.
L. L. Meixner]

[ART H 462 Topics in Early Modernism #
Fall and spring. 4 credits. Prerequisite: permission of instructor. Auditing is not permitted. Not open to freshmen or sophomores.
L. L. Meixner]

[ART H 463 Chinese Art of the T'ang Dynasty #
M. W. Young]

[ART H 466 Women Artists (also Women's Studies 404) #
4 credits. Prerequisite: permission of instructor. J. E. Bernstock.
This seminar will be devoted to a study of the work of women artists from antiquity to the present. The works of the most prominent women artists from each period will be studied in relation to the changing roles of women in society. The artists to be studied include Jennifer Bartlett, Artemisia Gentileschi, Elizabeth Vigee-Lebrun, Mary Cassatt, Käthe Kollwitz, Georgia O'Keeffe, Louise Nevelson, Joan Mitchell, Judy Chicago, and Barbara Kruger.

[ART H 470 Postmodernist Art and Criticism (also Comparative Literature 474)
4 credits. Prerequisite: permission of instructor. Not offered 1995–96.
H. Foster]

[ART H 476 Seminar in American Art #

[ART H 477 Impressionism in America and France #
4 credits. Prerequisite: permission of instructor. Not offered 1995–96.
L. L. Meixner]

[ART H 478 Post-Impressionism in France #
L. L. Meixner]

[ART H 481 The Arts in Modern China @
4 credits. Not offered 1995–96.]

[ART H 482 Ceramic Art of China and Southeast Asia @ #
4 credits. Prerequisite: permission of instructor. Not offered 1995–96.
S. J. O'Connor]

[ART H 484 Studies in Chinese Painting @ #
M. W. Young]

[ART H 486 Traditional Arts of Southeast Asia @
S. J. O'Connor]

[ART H 489 Miniature Paintings and Drawings of India @
Fall. 4 credits. Prerequisite: permission of instructor.
S. J. O'Connor.
The seminar will focus on the miniature paintings created in both the Mughal and Rajput courts. Although each tradition has characteristic perceptual features and thematic preoccupations, artists and patrons moved between courts and there was also a remarkable degree of interchange and reciprocal influence. The cultural and political ambience will be explored.

[ART H 494 Feminist Theory and the History of Art #
4 credits. Prerequisite: permission of instructor. Not offered 1995–96.
K. Barzman.
Seminar participants will examine the impact of feminist theory on art historical practice. Based on critical analysis of texts from the early 1970s to the present, we will consider the range of methods employed, the discursive traditions to which they belong (e.g., liberal, Marxist, psychoanalytic, poststructuralist), the role of critics of the methods, and the interpretive problems they present. At the graduate level, some additional meetings and work required.]

[ART H 520 Seminar in Classical Archaeology (also Classics 630 and Archaeology 520)
Fall. 4 credits. Prerequisite: permission of instructor. R. G. Calkins.

[ART H 540 Seminar in Renaissance Art #
4 credits. Prerequisite: permission of instructor. Not offered 1995–96.
C. Lazzaro]

[ART H 549 Problems in Interpretation in Italian Renaissance Art #
Fall. 4 credits. Prerequisite: permission of instructor. C. Lazzaro.
This seminar will examine assumptions about meaning and how meaning is produced in Renaissance art. Various interpretative strategies will be examined, among them iconographic, semiotic, feminist, and psychoanalytic, within a specifically Renaissance literary, intellectual, and social context. Text by Paroissky and critical discussions of them, Baxandall, Byrson, and others will be read and discussed in reference to particular works of art. The seminar is intended primarily for graduate students in all areas of History of Art and those in other disciplines with an interest in the Italian Renaissance. Senior History of Art majors with background in the Italian Renaissance are also welcome.

[ART H 570 Theories of Modernism Topic: "The Dehumanization of Art" (also Comparative Literature 672)
Spring. 4 credits. Prerequisite: permission of instructor. H. Foster.
The charge of "dehumanization" is an old critique of modernist culture. In what ways was this dehumanization the desired goal of such movements as Futurism, Dada and Surrealism, Constructivism? Why are the machinic and the inanimate often embraced in these and other movements? In what ways might "playing dead" be an artistic and critical strategy? More recent art and theory (e.g., the contemporary fascination with the abject) will also be discussed.

[ART H 580 Problems in Asian Art #
4 credits. Prerequisite: permission of instructor. Not offered 1995–96.
S. J. O'Connor]
ART H 591-592 Supervised Reading
591, fall; 592, spring 4 credits. May be repeated for credit. Limited to graduate students.

[ART H 594 Feminist Theory and the History of Art
4 credits. Prerequisite: permission of instructor. Not offered 1995-96. K. Barzman.]

ART H 595 Art History and Visual Culture (also Comparative Literature 625)
Fall, 4 credits. Prerequisite: permission of instructor. H. Foster.
What is art history? How was it constituted as a discipline in the 19th century? What are its parameters? What relation does it have to art history? to cultural and/or media studies? Readings will include classic texts of art history (Riegl, Wolfflin, Panofsky) and new writings in visual culture (Norman Bryson, Hubert Damisch, Rosalind Krauss, Jonathan Crary, others).

ART H 596 Problems in Art Criticism

ART H 600 Honors Work
Fall or spring. 8 credits. Intended for senior art history majors who have been admitted to the honors program. Basic methods of art historical research will be discussed and individual readings assigned, leading to the selection of an appropriate thesis topic.

ART H 601 Honors Work
Fall or spring. 8 credits. Prerequisite: History of Art 600. The student under faculty direction will prepare a senior thesis.

INDONESIAN
See Department of Modern Languages and Linguistics.

FALCON Program

ITALIAN LANGUAGE AND LINGUISTICS
See Department of Modern Languages and Linguistics.

ITALIAN LITERATURE
See Department of Romance Studies.

JAPANESE
See Departments of Asian Studies and Modern Languages and Linguistics.

JAVANESE
See Department of Modern Languages and Linguistics.

KHMER (CAMBODIAN)
See Department of Modern Languages and Linguistics.

KNIGHT, JOHN S., WRITING PROGRAM
See John S. Knight Writing Program in “Special Programs and Interdisciplinary Studies” at the end of the Arts and Sciences section of this catalog.

LATIN
See Department of Classics.

LINGUISTICS
A. Cohn, director of undergraduate studies (216 Morrill Hall, 255-3073). See Department of Modern Languages and Linguistics.

MATHEMATICS

Mathematics is the language of modern science; basic training in the discipline is essential for those who want to understand, as well as for those who want to take part in, the important scientific developments of our time. Acquaintance with mathematics is also extremely useful for students in the social sciences and valuable for anyone interested in the full range of human culture and the ways of knowing the universe in which we live.

The Department of Mathematics faculty has strong groups specializing in algebra, number theory, real and complex analysis, Lie groups, topology and geometry, logic, probability and statistics, mathematical physics, and applied mathematics. Related departments at Cornell have specialists in computer science, operations research, linear programming, and game theory; and courses in these topics can be integrated readily into the mathematics major.

The department offers a rich variety of undergraduate courses, and many of its beginning graduate courses are suitable for advanced undergraduates as well. Under some conditions, a student may carry out an independent reading and research project for college credit under the supervision of a faculty member.

Members of the department are available to discuss with students the appropriate course for their levels of ability and interest, and students are urged to avail themselves of this help.

Students who wish to take any of the courses numbered 300 or above are invited to confer, before registering, with the instructor concerned. The level of a course is indicated by the first digit of the course number: roughly, 1, 2, indicate undergraduate courses; 3, 4, upperclass courses; 5, 6, graduate courses. The subject matter of courses is often indicated by the second digit: 0, general; I, analysis; 3, 4, algebra; 5, 6, topology and geometry; 7, probability and statistics; 8, logic; 9, other.

Midterm grades, when required, will be S or U only, except in special circumstances. In all 600-level courses, all grades will be S-U only, with the exception of 690. In courses with numbers below 600, students will receive letter grades, with the exception of non-mathematics majors who have requested an S-U grade.

Advanced Placement
Secondary school students are strongly urged to take one of the two advanced placement examinations of the College Entrance Examination Board in their senior year. Freshmen who have had some calculus but who have not taken an advanced placement examination should take the placement examination in mathematics offered at Cornell just before the beginning of classes in the fall. It is most important that anyone with any knowledge of calculus carefully read “Advanced Placement,” p. 5.

The Major
The mathematics major adapts to a number of purposes. It can emphasize the theoretical or the applied. It can be appropriate for professionals and nonprofessionals alike. It can be broad or narrow. Questions concerning the major should be brought to a departmental representative.

Prerequisites: The traditional prerequisites are Mathematics 221-222 or 293-294. A unit on infinite series is required. Such a unit is offered in Mathematics 112, 122, and 192. Normally students will be admitted to the major only when they have grades of B+ or better in all sophomore-level mathematics courses they have taken. Alternative prerequisites are Mathematics 213, 231, normally with grades of B+ or better.

Requirements
There are five requirements for the major:

1) Computer Science 100. Students are urged to take this course before the end of the sophomore year.

2) Two courses in algebra. Eligible courses are Mathematics 431 or 433, 432 or 434 or 352, 356.

3) Two courses in analysis. Eligible courses are Mathematics 321, 411 or 413, 412 or 414, 418, 420, 422, 423, 427, 428.

4) Further high-level mathematical courses. Any one of the following is sufficient:
   a) four additional Mathematics courses numbered 300 or above.
b) (Concentration in Computer Science) five additional courses from i) and ii) below, of which at least one is from i) and three are from ii):
  i) Mathematics courses numbered 300 or above
  ii) Computer Science courses numbered 310 or above

c) (Concentration in Operations Research) five additional courses from iii) and iv) below, of which at least one is from iii) and three are from iv):
  iii) Mathematics courses numbered 300 or above
  iv) courses in Operations Research and Industrial Engineering, typically out of 320–361 (excluding 350) and/or out of 431–472.

These three alternatives do not exhaust the possibilities. For example, one very frequent double major is Economics/Math, in which case a suitable individual program can be put together in consultation with the student’s adviser.

5) One course dealing with mathematical models. Any course from outside mathematics with serious mathematical content and dealing with scientific matters, provided the course has not been used toward satisfying the previous requirement, e.g., Physics 208, 213, or 217 (but not 112 or 207), or Computer Science 211 (if Computer Science option not used above). Students may consider courses from biology, chemistry, economics, and other fields; they should consult their adviser.

A course may be counted toward the mathematics major only if a grade of C- or better is received for that course.

Major advisers can alter these requirements upon request of an advisee, provided the intent of the requirements is met. (The requirements for Mathematics majors declared before July 1, 1994 are slightly different from what is stated here, particularly in respect to Requirement 4).

Honors Program

The Department of Mathematics awards honors (cum laude) and high honors (magna cum laude and summa cum laude) to graduating mathematics majors who have demonstrated outstanding ability in the major program.

The awards are determined by the Mathematics Major Committee in the latter part of the semester prior to graduation. Normally, one requirement for honors is participation in the Honors Seminar (Math 401) for one semester, or independent study at a high performance level. The committee will also be looking for excellent performance in mathematics courses, particularly in challenging courses at the 400-level or beyond. Students interested in honors should consult their major advisers concerning suitable courses.

To be considered for high honors, a student usually will be expected to write a Senior Thesis, and present it orally to the department. This project is carried out during the senior year under the supervision of a member of the Mathematics department faculty. Students interested in high honors should consult their major advisers and the Mathematics major director during the second semester of their junior year.

Teacher Education in Science and Mathematics (TESM)

Students at Cornell may pursue teaching credentials in biology, chemistry, earth science, general science, mathematics, and physics. TESM is a university program jointly conducted by the departments of education and mathematics. Although TESM offers options for undergraduate and graduate study, most students enroll in a five-year program, which combines an undergraduate major in mathematics or one of the sciences with a one-year Master of Arts in Teaching (MAT). Students from any college at Cornell are eligible to apply to the program as undergraduates. Students who complete their undergraduate studies and their student teaching are eligible for provisional teaching certification from the State Education Department, effective for five years. Students completing the graduate program can earn the master’s degree required for permanent certification.

For more information, contact the TESM Student Support Specialist at 255-9255 or the TESM program coordinator, D. Trumbull (Education) 255-3108 or, in Mathematics, A. Solomon 255-3894.

Distribution Requirement

Virtually all Mathematics courses can be used to satisfy the Group 4a (Mathematics or Computer Science) Distribution Requirement I (for students through the class of 1995) or the Quantitative and Formal Reasoning part of Distribution Requirement II (beginning with students in the class of 1996). Explicit exceptions are noted in the beginning of the Arts and Sciences section of the Courses of Study.

Basic Sequences

Precalculus

1) Algebra and trigonometry to prepare students for calculus
   - Mathematics 109 or Agriculture and Life Sciences 5

2) Algebra, analytic geometry, elements of calculus
   - Agriculture and Life Sciences 115

*Mathematics 109 and ALS 5 do not carry credit for graduation.

**Students who want a second semester of mathematics after ALS 115 may take Mathematics 105 or if they need more calculus, 111.

Calculus

1) Standard three-semester sequence for students who do not expect to take advanced courses in mathematics
   - Mathematics Course Numbers 111–112–213

2) Calculus for engineers (also taken by some physical science majors)
   - Mathematics Course Numbers 191–192–293–294

3) Prospective mathematics majors and others who expect to take advanced courses in mathematics; many sequences are possible. For example, 111–112–221–222; or 121–122–221–222; or the engineering sequence 191–192–293–294; or a mix of the above. There is no specifically "approved" basic sequence for mathematics majors. Students should consult with their advisers for each individual case.

Mathematics 191 may be substituted for 111 in sequences 1 and 3. 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 3 and take 221.

Special-Purpose Sequences

1) Finite mathematics and calculus for biology majors
   - Mathematics Course Numbers 105–106

2) Other possible finite mathematics and calculus sequence
   - Mathematics Course Numbers 105–111

Courses with Overlapping Content

Because the department offers many courses with overlapping content, students should 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.

106, 111, 191

112, 122, and 192

112, 115, 431

213 and 222

221, 293, and 231

332 and 432

336 and 436

321 and 420

Fees

In some courses there may be a small fee for computer lab use or for photocopying materials to be handed out to students.

Undergraduate Course Offerings

Foundation courses: 105, 106, 107, 109, 111, 112, 121, 122, 123, 191, 192, 213, 221, 222, 293, 294

History of Mathematics: 101, 403

General Courses: 103, 105, 280, 401, 405, 408, 490, 508, 690

Analysis: 411, 412, 413, 414, 418

Algebra: 231, 332, 336, 431, 432, 433, 434, 436
Geometry and Topology: 150, 356, 451, 452, 453, 454, 455
Probability and Statistics: 171, 471, 472
Mathematical Logic: 481, 483, 486, 487

MATH 101 History of Mathematics #
Summer. 4 credits. Prerequisite: three years of high school mathematics. The history of the main ideas of mathematics from Babylonian, Egyptian, and Greek times to the present day.

MATH 103 Mathematical Explorations
Fall, spring, or summer. 3 credits. This course may be used to satisfy the distribution requirement in mathematics. This course is for students who wish to experience how mathematical ideas naturally evolve. The homework will consist of the students actively investigating mathematical ideas. The course will emphasize ideas and imagination as opposed to techniques and calculations. Topics will vary depending on the instructor. Some assessment will be done through writing assignments.

MATH 105 Finite Mathematics for Biologists
Fall or summer. 3 credits. Prerequisite: three years of high school mathematics, including trigonometry and logarithms. Mathematical modeling, sets, functions, and graphing (including use of log and semi-log paper). Probability (with some applications to genetics). Matrices, systems of linear equations, and Markov chains. Examples from biology are used.

MATH 106 Calculus for Biologists
Spring or summer. 3 credits. Prerequisite: Mathematics 105 or 109 or ALS 115 or permission of instructor. (A strong background in functions is required.) Mathematics 111, rather than 106, is recommended for those planning to take 112.*
Introduction to differential and integral calculus, partial derivatives, elementary differential equations. Examples from biology are used.

MATH 107 Mathematics for the Social Sciences
Fall. 3 credits. Not offered 1995–96. This course consists of an introduction to several topics in mathematics such as: permutations and combinations, probability theory, matrices, limits, derivatives, exponential and logarithmic functions. The goal is to enable a social science student to understand some principles and applications of mathematics.

MATH 109 Precalculus Mathematics
Summer. 3 transcript credits only; cannot be used toward graduation. This course is designed to prepare students for Mathematics 111. Algebra, trigonometry, logarithms, and exponentials are reviewed.

MATH 111 Calculus
Fall, spring, or summer. 4 credits. Limited to 22 students a section. Prerequisite: Mathematics 109 or three years of high school mathematics, including trigonometry.*

MATH 121 Modern Calculus
Fall. 4 credits. Limited to 22 students per section. Prerequisite: Three years of high school mathematics, including calculus. This is a first-semester honors course in calculus intended for students who have had calculus in high school. The course material will be the same as that in Math 111, but it will be covered in greater depth.

MATH 122 Calculus
Fall or spring. 4 credits. Prerequisite: one semester of calculus with a high performance or permission of the department. Students planning to continue with Mathematics 213 are advised to take 112 instead of this course.*
Differentiation and integration of elementary transcendental functions, the techniques of integration, applications, polar coordinates, infinite series, and complex numbers, as well as an introduction to proving theorems. The approach is more theoretical than in Mathematics 112.

MATH 123 Analytic Geometry and Calculus
Summer. 4 credits. Prerequisite: High school mathematics through trigonometry and plane analytic geometry.
The honors section of Math 111. Covers the same topics more deeply (at the level of Apostol's Calculus).

MATH 150 From Space to Geometry
Over the centuries mathematicians have interpreted the concept of “space” in numerous ways. This course will survey some of these approaches from the time of Euclid to the later perspective of non-Euclidean systems. We will evaluate the impact of these viewpoints on such concepts as distance, angle measurement, straightness and curvature, dimension, and surface. We will make and analyze models to get a feel for the concepts and to assess the relevance of various approaches to geometry.

MATH 171 Statistical Theory and Application in the Real World
Fall, spring, or summer. 4 credits. Prerequisites: high school mathematics. This introductory statistics course will discuss techniques for analyzing data occurring in the real world and the philosophical and mathematical implications for these techniques. Topics include population and sample distributions, central limit theorem, and statistical theories of point estimation.

*See the list of courses with overlapping content at the end of the introduction.
induction, etc.), together with numerous examples of turning intuitive notions into precise mathematical concepts. The foundations of set theory and the construction of the real numbers are presented, together with other illustrative topics from analysis, algebra, and geometry.

**MATH 293 Engineering Mathematics**

Fall, spring, or summer. 4 credits. Prerequisites: Mathematics 192 plus a knowledge of computer programming equivalent to that taught in Engineering Common Courses 100. In exceptional circumstances, Mathematics 192 and 293 may be taken concurrently.\(^*\)

Introduction to physical vectors, linear algebra and matrix theory, inner product spaces. May include computer use in solving problems.

**MATH 294 Engineering Mathematics**

Fall, spring, or summer. 4 credits. Prerequisite: Mathematics 293.\(^*\)


**MATH 321 Applicable Analysis**

Fall, spring, or summer. 4 credits. Prerequisites: high level of performance in Mathematics 294, or 221 and 222, or 213 and 231. Graduate students who need mathematics extensively in their work and who have had solid courses in calculus and complex variables should take Mathematics 515–516. With less preparation they should take Mathematics 420 (or 321–422–423).\(^*\) (This course was formerly Mathematics 421.)


**MATH 332 Algebra and Number Theory**

Fall 4 credits. Prerequisites: one year of calculus and one course from Mathematics 221, 231, and 294. Mathematics 332 does not satisfy prerequisites for courses numbered 500 and above.\(^*\)

Various topics from modern algebra and number theory, usually including rings, fields, and finite groups. Motivation and examples are derived mostly from geometry, arithmetic, and congruence problems on the integers.

**MATH 336 Applicable Algebra**

Spring. 4 credits. Prerequisites: Mathematics 221, 294, or 231.

An introduction to concepts and methods of abstract algebra that are of importance in science and engineering. Applications of the theory to concrete problems will be stressed. Each year the course will treat aspects usually chosen from the following topics: partially ordered sets, lattices, graph theory, and Boolean algebras, finite machines and languages, applications of groups, fields, and modular arithmetic, such as Latin squares, elementary coding theory, or fast Fourier transform; difference equations. Additional topics may be chosen by the instructor.

**MATH 356 Groups and Geometry**

Spring. 4 credits. Prerequisites: Math 221–222, or Math 293–294.

Groups were introduced in the nineteenth century as the set of symmetries of an algebraic or geometric object, and this viewpoint is a central one in modern mathematics. This course studies Euclidean and non-Euclidean (especially hyperbolic) geometry in terms of the group of symmetries of the relevant spaces. Prior knowledge of groups is not a prerequisite. One aim is to give students experience in modern algebra and geometry (including the geometry of complex numbers) and a sense of the unity of mathematics before they take the 400-level courses. Special care is taken in learning to write proofs. Groups of transformations. Subgroups and cosets. Homomorphisms and isomorphisms of groups. Cosets of subgroups. Friese groups and wallpaper groups and associated tessellations of the Euclidean plane. Geometry and trigonometry of the hyperbolic plane. Tessellations of the hyperbolic plane.

The purpose of this course is for students to step back and to form an overview of the mathematics they have learned.

**MATH 411-[412] Introduction to Analysis**

Fall, fall, spring, 4 credits. 412 not offered 1995–96; expected to be offered 1996–97. Prerequisite: Mathematics 222. Prerequisite for Mathematics 412: 411 or 413. 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 Mathematics 413–414.

An introduction to the theory of functions of real variables, stressing rigorous logical development of the subject rather than technique of applications. Topics include Euclidean spaces, the real number system, continuous and differentiable functions, Riemann integral, uniform convergence and approximation theorems, Fourier series, calculus in several variables, and differential forms.

**MATH 413-414 Introduction to Analysis**

Fall, fall, spring, 4 credits. Prerequisite: Mathematics 412. Prerequisite for Mathematics 414: Mathematics 413. Honors version of Mathematics 411–412. 415 proceeds at a faster pace than 411. The second semester includes an introduction to the Lebesgue integral.

**MATH 418 Introduction to the Theory of Functions of One Complex Variable**

Spring. 4 credits. Prerequisite: Mathematics 222. Prerequisite for Mathematics 414: Mathematics 413. 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.

**MATH 420 Applicable Analysis**

Fall or spring. 4 credits. Prerequisites: high level of performance in Mathematics 294, or 221 and 222, or permission of instructor. Graduate students who need mathematics extensively in their work and who have had solid courses in calculus and complex variables should take Mathematics 515–516. With less preparation they should take Mathematics 420 (or 321–422–423).\(^*\)

Ordinary differential equations in one and higher dimensions: qualitative, analytic, and numerical methods, with physical applications. Some important partial differential equations (heat equation, wave equation, and vibrating membrane) and their connections with Fourier series and the Laplace Equation, and Fourier transforms. Applications to electromagnetism. Mathematics 420 has substantial overlapping content with Mathematics 321, but more strongly emphasizes the mathematical properties of solutions of ordinary differential equations and the approximation to such solutions by numerical and computer methods.

**MATH 450 Mathematical Exposition**

Fall 3 credits.\(^*\)

A seminar in mathematics and its applications to other fields. Students are asked to have had at least two years of college-level mathematics. Course work will consist of discussions, written projects, and student talks. The content of these discussions, projects, and talks will vary, to be determined by the instructor in consultation with the students.

**MATH 460 Mathematics in Perspective**

Spring 4 credits. Prerequisite: consent of instructor (intended for senior mathematics majors and other students with strong mathematics backgrounds).

\(^*\)See the list of courses with overlapping content at the end of the introduction.
ARTS AND SCIENCES - 1995-1996

MATH 422 Applicable Analysis
Fall, spring, or summer. 4 credits.
Prerequisite: Mathematics 420 or 321.
Complex variables, Fourier transforms, Laplace transforms. Additional topics may include: An introduction to generalized functions. Applications to partial differential equations.

MATH 423 Applicable Analysis
Spring. 4 credits. Prerequisite: Mathematics 420 or 321; however, students who have not taken 422 should talk to the instructor before taking this course. Normed vector spaces. Elementary Hilbert space theory. Projections. Fredholm's alternative. Eigenfunction expansions. Applications to elliptic partial differential equations and to integral equations.

MATH 425 Numerical Solutions of Differential Equations
Spring. 4 credits. Prerequisites: Mathematics 222 or 294, one course numbered 300 or higher, linear algebra, or permission of instructor. Expected to be offered 1996-97.

MATH 427 Introduction to Ordinary Differential Equations
Fall. 4 credits. Prerequisite: Mathematics 222 or 294 or permission of instructor. Covers the basic existence, uniqueness, and stability theory together with methods of solution and methods of approximation. Topics include singular points, series solutions, Sturm-Liouville theory, transform methods, approximation methods, and application to physical problems.

MATH 428 Introduction to Partial Differential Equations
Spring. 4 credits. Prerequisite: Mathematics 222 or 294 or permission of instructor. Topics selected from first-order quasilinear equations, classification of second-order equations, with emphasis on maximum principles, existence, uniqueness, stability. Fourier series methods, approximation methods.

MATH 431-432 Introduction to Algebra
Spring. 4 credits each. Prerequisite: Mathematics 431 or 433. Undergraduates who plan to attend graduate school in mathematics should take 433-434.*
431. An introduction to linear algebra, including the study of vector spaces, linear transformations, matrices, and systems of linear equations; quadratic forms and inner product spaces; canonical forms for various classes of matrices and linear transformations; determinants. 432: an introduction to various topics in abstract algebra, including groups, rings, fields, factorization of polynomials and integers, congruences, and the structure of finitely generated modules over Euclidean domains with application to canonical forms of matrices.

MATH 433-434 Introduction to Algebra
Fall. 4 credits each. Prerequisite: Mathematics 431 or 433. Undergraduates who plan to attend graduate school in mathematics should take 433-434.*
433. An introduction to 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. 434: more theoretical and rigorous than 431-432 and will include additional material such as multilinear and exterior algebra.

MATH 436 Applications of Abstract Algebra
Spring. 4 credits. Not offered 1995-96. Expected to be offered 1996-97. Prerequisites: Linear algebra (Math 231 or higher). Math 336 is not a prerequisite; familiarity with elementary algebra or number theory such as Math 352 would be helpful.
The course is intended for students who would like to learn modern algebra and its applications outside of mathematics. There will be at least as much emphasis on applications as the relevant modern algebra. Frequently, the applications involve or were made possible by the advent of computers. Students who already know the modern algebra covered in the course may still find the applications to be of interest. Specific topics will be chosen by the instructor. The algebra to be covered includes drawings of linearly independent element theory, polynomials and ring theory, monoids and homomorphism theory, real closed fields, algebraic combinatorics, Groebner bases, algebraic geometry, field theory. The applications and related topics typically include items drawn from: complexity theory, coding theory, encryption, discrete and fast Fourier transform, primality testing, factoring integers and polynomials, root counting and isolation, solving systems of polynomial equations, formal language theory and automata.
Math 336 and 436 may overlap in choice of material. Where they overlap, the coverage in Math 436 will be of greater depth appropriate to a 400-level course. Students cannot get credit for both Math 336 and Math 436.

MATH 451 Euclidean and Spherical Geometry
Fall. 4 credits. Prerequisite: Mathematics 221 or 231 or permission of instructor. Topics from Euclidean and spherical (non-Euclidean) geometry. A non-lecture, seminar-style course organized around student participation.

MATH 452 Classical Geometries
Spring. 4 credits. Prerequisites: Mathematics 221 or its equivalent.
This is an introduction to hyperbolic, spherical, and projective geometry—the classical geometries that developed as Euclidean geometry by the advent of computerized straightedge and compass constructions and stereographic projection in Euclidean geometry can be understood within the structure of projective geometry. Topics in hyperbolic geometry include models of the hyperbolic plane and relations to spherical geometry.

Topics in projective geometry include homogeneous coordinates and the classical theorems about conics and configurations of points and lines. Optional topics include principles of perspective drawing, finite projective planes, orthogonal Latin squares, and the cross ratio.

MATH 453 Introduction to Topology
Fall. 4 credits. Prerequisites: Mathematics 411 and 221, or permission of instructor. Basic point set topology, connectedness, compactness, metric spaces, fundamental group. Application of these concepts to surfaces such as the torus, the Klein bottle, the Moebius band.

MATH 454 Introduction to Differential Geometry
Spring. 4 credits. Prerequisites: Mathematics 222 or 294, plus at least one mathematics course numbered 300 or above. Mathematics 453 is not a prerequisite. Differential geometry of curves and surfaces. Curvature, geodesics, differential forms. Introduction to n-dimensional Riemannian manifolds. This course gives some background for the study of general relativity. Connections with the latter will be indicated.

MATH 455 Applicable Geometry
Fall. 4 credits. In general, this course will cover various applicable topics to be chosen from among the geometry of convex bodies, polyhedra, algebraic curves and surfaces, rigid polyhedra, crystallographic patterns, projections and similar topics. Computational aspects of geometry will be included where appropriate.

MATH 471 Basic Probability
Fall. 4 credits. Prerequisite: Mathematics 221. May be used as a terminal course in basic probability. Intended primarily for those who will continue with Mathematics 472.
Topics include combinations, important probability laws, expectations, moments, moment-generating functions, limit theorems. Emphasis is on diverse applications and on development of use in statistical applications. See also the description of Mathematics 571.

MATH 472 Statistics
Spring. 4 credits. Prerequisite: Mathematics 471 and knowledge of linear algebra such as taught in Mathematics 221. Some knowledge of multivariate calculus helpful but not necessary.
Classical and recently developed statistical procedures are discussed in a framework that emphasizes the basic principles of statistical inference and the rationale underlying the choice of these procedures in various settings. These settings include problems of estimation, hypothesis testing, large sample theory.

MATH 481 Mathematical Logic (also Philosophy 431)
Spring. 4 credits. Prerequisite: Mathematics 411 or 420, or Philosophy 431.
Topics include combinations, important probability laws, expectations, moments, moment-generating functions, limit theorems. Emphasis is on diverse applications and on development of use in statistical applications. See also the description of Mathematics 571.

MATH 481 Mathematical Logic (also Philosophy 431)

*See the list of courses with overlapping content at the end of the introduction.
Mathematics 417

MATH 483 Intuitional Logics and Alternatives to Classical Logics
(also Philosophy 436)
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Not offered 1995–96. For description, see PHIL 436.

MATH 486 Applied Logic (also the COM 486)
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Spring. 4 credits. Prerequisites: Mathematics 222 or 294; COM S 100, and some additional course in mathematics or theoretical computer science. 2 lectures, 1 lab to be arranged.

MATH 487 Applied Logic II
---
Intuitionistic propositional and predicate logic. Natural deduction and tableaux as proof procedures. Curry partial application structures. Their polynomial extensions as lambda calculi. Typed and untyped lambda calculi, cartesian closed categories. Heyting semantics of constructions as representations in partial combinatory structures, Kleene realizabilities. Curry-Howard isomorphisms. Intuitionistic first order arithmetic and Gödel's system T. Intuitionistic higher order logic and polymorphism. Weak and strong normalization for simple and polymorphic calculi. Application to consistency proofs. Term extraction as the context for understanding compilers and interpreters for applicative languages such as Lisp, Nuprl, Miranda, etc.

MATH 490 Supervised Reading and Research
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Fall, spring, or summer. 1–6 credits. Supervised reading and research by arrangement with individual professors. Not applicable for material currently available in regularly scheduled courses.

Graduate Courses

Students interested in taking graduate courses in mathematics should consult the department for further course details, times, and possible changes in courses as described below.

MATH 508 Mathematics for Secondary School Teachers
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Fall, spring, or summer. 1–6 credits. Prerequisite: secondary school mathematics teacher, graduate standing, or permission of instructor. May not be taught every semester.
An examination of the principles underlying the content of the secondary school mathematics curriculum, including connections with the history of mathematics and current mathematics research.

MATH 511–512 Real and Complex Analysis
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511: fall; 512: spring. 4 credits each. 511: measure and integration, functional analysis. 512: complex analysis, Fourier analysis, and distribution theory.

MATH 513–514 Topics in Analysis
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MATH 515–516 Mathematical Methods in Physics
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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.

MATH 517 Dynamical Systems
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MATH 518 Smooth Ergodic Theory
---

MATH 519–520 Partial Differential Equations
---
519, fall; 520, spring. 4 credits each. Not offered 1995–96. Expected to be offered 1996–97.
Basic theory of partial differential equations.

MATH 521 Measure Theory and Lebesgue Integration
---
Fall. 4 credits.
Measure theory, integration, and Lp spaces.

MATH 522 Applied Functional Analysis
---
Spring. 4 credits.
Basic theory of Hilbert and Banach spaces and operations on them. Applications.

MATH 531–532–534 Algebra
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531, fall; 534, spring; [532, Not offered 1995–96.] 4 credits each.
531: finite groups, field extensions, Galois theory, rings and algebras, tensor and exterior algebra. 532: Wedderburn structure theorem, Brauer group, group cohomology. 534: Dedekind domains, primary decomposition, Hilbert basis theorem, local rings.

MATH 537 Analytic Number Theory

MATH 540 Lie Algebras
---
Spring. 4 credits. Expected to be offered fall 1996–97.

MATH 551 Introductory Algebraic Topology
---
Spring. 4 credits. Fundamental group and covering spaces. Homology theories for complexes and spaces.

MATH 552 Differentiable Manifolds
---
Fall. Prerequisites: advanced calculus, linear algebra (Mathematics 431), point set topology (Mathematics 453). This is an introduction to differential topology and differential geometry at the level of the beginning graduate student.

MATH 551 Geometric Topology
---
Fall. 4 credits.
An introduction to some of the more geometric aspects of topology and its connections with group theory. Possible topics: surface theory, 3-manifolds, knot theory, geometric and combinatorial group theory, hyperbolic groups, hyperbolic manifolds.

MATH 562 Riemannian Geometry
---
Spring. 4 credits.
MATH 571-572 Probability Theory
571, fall; 572, spring. 4 credits each.
Prerequisite: a knowledge of Lebesgue integration theory, at least on the real line. Students can learn this material by taking part of Mathematics 413-414 or 521. Prerequisite for Mathematics 572: Mathematics 571.


MATH 574-575 Introduction to Mathematical Statistics
574, spring; 575, fall. 4 credits each.
Prerequisites: Mathematics 571 or permission of instructor.

574: Topics include an introduction to the theory of point estimation, consistency, efficiency, sufficiency, and the method of maximum likelihood. Convexity and basic concepts of decision theory are introduced. Concepts of sequential methods may be discussed. 575: The classical theory of optimal tests of hypotheses and their power; the theory of confidence sets. The preferred sequence is 574-575.

MATH 581 Logic
Spring. 4 credits.
Basic topics in mathematical logic, including propositional and predicate calculus; formal number theory and recursive functions; completeness and incompleteness theorems. Other topics as time permits.

MATH 611 Seminar in Analysis
Spring. 4 credits.
MATH 612 Seminar in Analysis
Spring. 4 credits.
MATH 613 Functional Analysis
Fall: 4 or 5 credits.
Topological vector spaces. Banach and Hilbert spaces, Banach algebras. Additional topics to be selected by instructor.

MATH 615 Fourier Analysis
Fall. 4 credits.

MATH 617 Applied Dynamical Systems (also T&AM 776)

MATH 623 Several Complex Variables
Not offered 1995-96. 4 credits.

MATH 627-628 Seminar in Partial Differential Equations
[627, fall; not offered 1995-96.] 628, spring. 4 credits.

MATH 631-632 Seminar in Algebra
631, fall; 632, spring. 4 credits each.

MATH 635 Topics in Algebra
Fall. 4 credits.
Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

MATH 637 Algebraic Number Theory
Spring. 4 credits.

MATH 639 Topics in Algebra II
Spring. 4 credits.
Selection of advanced topics from algebra, algebraic number theory, and algebraic geometry. Course content varies.

MATH 640 Homological Algebra

MATH 651-652 Seminar in Topology
651, fall; 652, spring. 4 credits each.

MATH 653-654 Algebraic Topology
653, fall; 654, spring. Not offered 1995-96. 4 credits.
The continuation of 551. Cohomology, cup products, Poincare duality, higher homotopy groups, fiber bundles, fibrations, vector bundles, characteristic classes, K-theory, spectral sequences, cohomology operations.

MATH 657-658 Topics in Topology
657, fall; 658, spring. Not offered 1995-96. 4 credits.
Selection of advanced topics from modern algebraic, differential, and geometric topology. Course content varies.

MATH 661-662 Seminar in Geometry
661, fall; 662, spring. 4 credits each.

MATH 667 Algebraic Geometry
Fall. 4 credits. Not offered 1995-96. Expected to be offered 1996-97.

MATH 670 Topics in Statistics
Fall or spring. 4 credits. Expected to be offered 1996-97.
A course taught occasionally to cover special topics in theoretical statistics not treated in other listed courses. Typical of the subjects that will be treated are time series analysis, and classification and cluster analysis.

MATH 671-672 Seminar in Probability and Statistics
671, fall; 672, spring. 4 credits each.

MATH 674 Multivariate Analysis

MATH 675 Statistical Decision Theory
Fall. 4 credits.

MATH 677-678 Stochastic Processes
677, fall; 678, spring. 4 credits each. Expected to be offered 1996-97.

MATH 681-682 Seminar in Logic
681, fall; 682, spring. 4 credits each.

MATH 683 Model Theory
Spring. 4 credits. Offered in alternate years. Not offered 1995-96.

MATH 684 Recursion Theory
Fall. 4 credits.

MATH 687 Set Theory
Spring. 4 credits. Offered in alternate years. Models of set theory. Theorems of Goedel and Cohen, recent independence results.

MATH 688 Topics In Applied Logic
Fall. 4 credits.
This course covers applications of the results and methods of mathematical logic to other areas of mathematics and science. Topics vary each year; some recent examples are: automatic theorem proving, formal semantics of programming and specification languages, linear logic, constructivism (intuitionism), non-standard analysis. The student is expected to be familiar with the standard results in graduate level mathematical logic.

MATH 690 Supervised Reading and Research
Variable credit (maximum 6 each term).

MATH 701-702 Oliver Club Seminar
Fall. 4 credits.
MATH 703-704 Olivetti Club Seminar
Fall. 4 credits.
MATH 707-708 Seminar in Mathematics Education
Fall. 4 credits. Not offered 1995-96.
MATH 711-712 Seminar in Analysis
Fall. 4 credits. Not offered 1995-96.
MATH 713 Seminar in Analytic Dynamics
Fall. 4 credits. Not offered 1995-96.
MATH 727-728 Seminar in Numerical Analysis
Fall. 4 credits. Not offered 1995-96.
MATH 731-732 Seminar in Algebra
Fall. 4 credits. Not offered 1995-96.
MATH 733-734 Seminar in Computational Algebra
Fall. 4 credits. Not offered 1995-96.
MATH 749-750 Seminar in Lie Groups
Spring. 4 credits. Not offered 1995-96.
MATH 751-752 Topics in Geometry and Topology
Spring. 4 credits. Not offered 1995-96.
MATH 767-768 Seminar in Combinatorial and Algebraic Geometry
Spring. 4 credits. Not offered 1995-96.
MATH 777 Reading Seminar in Dynamical Systems
Spring. 4 credits. Not offered 1995-96.

MODERN LANGUAGES AND LINGUISTICS

J. Bowers, chair; J. Lantolf, associate chair (314 Morrill Hall); J. Whitman, graduate faculty representative (320 Morrill Hall); A. Cohn, director of undergraduate studies (216 Morrill Hall); B. Lust, director of graduate studies (341 Morrill Hall); J. Jasanoff, A. Jongman, F. Landman, B. Lust, S. McConnell-Ginet, C. Nies, C. Rosen, M. Surier, L. Waugh, J. Wolff, D. Zec

The Department of Modern Languages and Linguistics offers courses in linguistics (the study of the general nature, structure, and history of language) and elementary, intermediate, and advanced courses in many of the languages of Europe, Africa, and south, southeast, and east Asia.

Most courses in modern languages and linguistics are offered by the Department of...
Modern Languages and Linguistics; see listings below under individual language names (e.g., Spanish) and under Linguistics. Courses in foreign language literatures and certain language courses as well are taught in the following departments: consult entries under the department name for course listings.

African Studies and Research Center: Ewe, Swhali
Asian Studies: Chinese, Japanese, Korean, Vietnamese
Classics: Greek, Latin, Sanskrit
German Studies: German
Near Eastern Studies: Akkadian, Arabic, Aramaic, Hebrew, Turkish
Romance Studies: French, Italian, Spanish
Russian Literature: Russian
The Full-year Asian Language Concentration (FALCON Program) offers intensive instruction in Chinese, Japanese, or Indonesian to students wishing to gain fluency in the language in a single year.

Arabic
See listings under Near Eastern Studies.

Bengali

Fees. A small fee may be charged for photocopied texts for course work.

BENG 121-122 Elementary Bengali
121, fall; 122, spring. 4 credits each term. Prerequisite: for Bengali 122, Bengali 121 or examination. D. Sudan.
The emphasis is on basic grammar, speaking, and comprehension skills; Bengali script will also be introduced.

BENG 201-202 Intermediate Bengali
Reading
201, fall; 202, spring. 3 credits each term. Prerequisites: for Bengali 203, Bengali 122 or examination. D. Sudan.
Continuing instruction in grammar with attention to speaking and reading skills.

BENG 203-204 Intermediate Bengali Composition and Conversation
203, fall; 204, spring. 3 credits each term. Prerequisites: for Bengali 203, Bengali 122 or examination; for Bengali 202, Bengali 201 or examination. D. Sudan.
Continuing instruction in grammar with attention to speaking and reading skills.

BENG 303-304 Bengali Literature I, II
303, fall; 304, spring. 4 credits each term. Prerequisites: Bengali 203-204 or equivalent. D. Sudan.
An introduction to noted Bengali writers. Selections of works by Rabindranath Tagore and Abanindranath Tagore and short stories by Boropithal will be covered. The course will be devoted to reading these works and developing literary criticism and creative writing in Bengali.

Burmese
NOTE: Check at Morrill 416 and Morrill 404 before classes begin for placement or other testing and organizational information, or contact J. Wheatley in Morrill 416 (255-9301).

Fees. A small fee may be charged for photocopied texts for course work.

BURM 103-104 Burmese Conversation Practice
103, fall; 104, spring. 2 credits each term. Prerequisite: for Burmese 104, Burmese 103 and Burmese 121. May not be taken alone. Must be taken simultaneously with Burmese 121-122. Satisfactory completion of Burmese 103/122 fulfills the qualification portion of the language requirement. S. Tun.
Additional drills, practice and extension of materials covered in Burmese 121 and 122. These courses are designed to be attended simultaneously with Burmese 121-122 respectively, allowing students to obtain qualification within a year.

BURM 121-122 Elementary Burmese
121, fall; 122, spring. 4 credits each term. Prerequisite: for Burmese 122, Burmese 121. May be taken alone or simultaneously with Burmese 103-104. Satisfactory completion of Burmese 104/122 fulfills the qualification portion of the language requirement. S. Tun.
A thorough grounding is given in all language skills: listening, speaking, reading, and writing.

BURM 123 Continuing Burmese
Fall. 4 credits. Prerequisite: Burmese 122. Satisfactory completion of Burmese 123 fulfills the qualification portion of the language requirement. S. Tun.
Continuing instruction in conversational and reading skills, to prepare students for 200-level courses.

BURM 201-202 Intermediate Burmese Reading
201, fall or spring; 202, fall or spring. 3 credits each term. Prerequisites: for Burmese 201, Burmese 202, Burmese 301, Burmese 203 or permission of instructor. S. Tun.
Continuing instruction in spoken and written Burmese.

BURM 203-302 Advanced Burmese Reading
203, fall or spring; 302, fall or spring. 3 credits each term. Prerequisites: for Burmese 301, Burmese 202 or permission of instructor; for Burmese 302, Burmese 301. S. Tun.
Continuing instruction in spoken and written Burmese; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.

BURM 401-402 Burmese Directed Independent Study
401, fall; 402, spring. 2-4 credits variable each term. Prerequisite: permission of instructor. S. Tun.
Various topics according to need.

Cambodian
See Khmer.

Cebuano (Bisayan)

Fees. A small fee may be charged for photocopied texts for course work.

CEBU 101-102 Elementary Cebuano
101, fall; 102, spring. Offered according to demand. 6 credits each term. Prerequisite for Cebuano 102. Cebuano 101 or equivalent. Not offered 1995-96. A semi-intensive course for beginners.

Chinese

Fees. Depending on the course, a small fee may be charged for photocopied texts for course work.

CHIN 101-102 Elementary Mandarin
101, fall; 102, spring. 3 credits each term. Prerequisite for Chinese 102: Chinese 101 or equivalent. Satisfactory completion of Chinese 102 fulfills the qualification portion of the language requirement. J. Wheatley and staff.
A course for beginners or those who have been placed in the course by examination. The course gives a thorough grounding in conversational and reading skills. Students with some facility in the spoken language (because Chinese is spoken at home) but who do not read Chinese 101 (because Chinese is spoken at home) but who speak 'dialects,' such as Cantonese or Amoy, should see the program director in Morrill 416 before enrolling.

CHIN 109-110 Elementary Reading (with Mandarin pronunciation)
109, fall; 110, spring. 3 credits each term. Prerequisite: for Chinese 102: Chinese 101 or equivalent. Satisfactory completion of Chinese 110 fulfills the qualification portion of the language requirement. X. Wang.
This course is intended primarily for students who speak some Chinese [i.e., at home], but who have had little or no formal training. The focus is on characters, reading comprehension, and reading aloud with standard pronunciation.

CHIN 111-112 Cantonese Elementary Speaking
111, fall; 112, spring. 3 credits each term. Prerequisites: for Chinese 112: Chinese 111 or equivalent. Both Chinese 112 and 114 or equivalents are necessary to fulfill any language requirements. J. Yang.
A course for beginners. Conversation in standard Cantonese as spoken in Hong Kong and Canton.

CHIN 113-114 Cantonese Elementary Reading
113, fall; 114, spring. 3 credits each term. Prerequisites: for Chinese 114: Chinese 113. Both Chinese 112 and 114 or equivalents are necessary to fulfill any language requirements. J. Yang.
This course is intended primarily for students who speak some Cantonese [i.e., at home], but who have had little or no formal training. The focus is on characters, reading comprehension, and reading aloud with standard pronunciation.

CHIN 201-202 Intermediate Mandarin
201, fall or summer; 202, spring or summer. 4 credits each term. Prerequisites: for Chinese 201, Chinese 102 or equivalent; for Chinese 202, Chinese 201. Satisfactory completion of Chinese 201...
fulfills the proficiency portion of the language requirement. Staff. Continuing instruction in written and spoken Chinese.

CHIN 211-212 Intermediate Cantonese @
211, fall, 212, spring. 4 credits each term. Prerequisites: for Chinese 211, Chinese 112 and 114 or equivalent; for Chinese 212, Chinese 211. J. Yang.
Continuing instruction in spoken Cantonese and in characters [Cantonese and Mandarin], reading comprehension, and reading aloud with Cantonone pronunciation.

CHIN 301-302 Advanced Mandarin I @
301, fall, 302, spring. 4 credits each term. Prerequisites: for Chinese 301, Chinese 202 or equivalent; for Chinese 302, Chinese 301. P. Wang.
Continuing instruction in spoken Chinese and in various genres and styles of written Chinese.

CHIN 303-304 Advanced Mandarin Conversation @
303, fall, 304, spring. 1 credit each term. Prerequisites: Chinese 201-202 or equivalent or permission from instructor. Staff.
Continued intensive practice for students who wish to maintain language skills. Guided conversation and oral composition and translation. Corrective pronunciation drills.

CHIN 411-412 Advanced Mandarin II
411, fall, 412, spring. 4 credits each term. Prerequisites: for Chinese 411, Chinese 302 or equivalent; for Chinese 412, Chinese 411. Q. Teng.
Reading and discussion of various styles and genres of Chinese. Special attention to building vocabulary and increasing reading speed. Selections from current events, newscasts, and literature.

CHIN 413-414 Current Events: Advanced Reading and Discussion
413, fall, 414, spring. 2 credits each term. Prerequisites: Chinese 412 or equivalent or permission of instructor. S-U grades only. P. Wang.
Reading practice for students in Chinese studies. Content varies.

CHIN 425 Topics in Chinese Language
Fall or spring, according to demand. 4 credits. Prerequisite: permission of instructor. J. Wheatley and staff.
This course is a cover symbol for a number of language courses that will be offered in rotation to accommodate both the needs of advanced or specialized students and to take advantage of faculty interests. Courses planned include: correspondence and composition; Ch'ing documents; Mandarin for Cantonese speakers. May be repeated for credit.

FALCON (Full-year Asian Language Concentration)
J. Wheatley, 416 Morrill Hall (255-9301).

CHIN 160 Introductory Intensive Mandarin
Summer only. 10 credits. J. Wheatley and staff.
Introduction to spoken and written Mandarin. Lectures on linguistic and cultural matters, intensive drills with native speakers, and laboratory work. Students who complete this course with a grade of B or above normally are eligible to enroll in an intermediate course.

CHIN 161-162 Intensive Mandarin @
161, fall; 162, spring. 16 credits each term. Prerequisites: for Chinese 161, Chinese 160 (Cornell summer intensive course) or equivalent or permission of instructor; for Chinese 162, Chinese 161. Satisfactory completion of Chinese 161 fulfills the proficiency portion of the language requirement.

Czech
Fees. A small fee may be charged for photocopied texts for course work.
CZECH 131-132 Elementary Czech
131, fall; 132, spring. 3 credits each term. Prerequisite for Czech 132, Czech 131 or equivalent. This language series (131-132) cannot be used to satisfy the language requirement. Staff.
Covers all language skills: speaking, listening comprehension, reading, and writing.

CZECH 133-134 Continuing Czech
133, fall; 134, spring. 3 credits each term. Prerequisites: for Czech 133, Czech 132 or equivalent. Satisfactory completion of Czech 134 fulfills the qualification portion of the language requirement. Staff.
An intermediate conversation and reading course.

Danish
Fees. A small fee may be charged for photocopied texts for course work.
DANISH 131-132 Elementary Danish
131, fall; 132, spring. 3 credits each term. Prerequisite for Danish 132, Danish 131 or equivalent. This language series cannot be used to satisfy the language requirement. Staff.
Covers all language skills: speaking, listening comprehension, reading, and writing.

DUTCH 121-122 Elementary Dutch
121, fall or summer; 122, spring or summer. 4 credits each term. Prerequisite: permission of instructor. M. Briggs.
Intensive practice in listening, speaking, reading, and writing. Students also practice giving oral presentations in Dutch seventeenth-century culture and its influence on the Americas. Taught in Dutch.

DUTCH 203 Intermediate Composition and Conversation
Spring. 5 credits. Prerequisite: Qualification in Dutch or permission of instructor. M. Briggs.
Improved control of Dutch grammatical structures and vocabulary through guided conversation, compositions and reading, drawing on Dutch and other Dutch-speaking cultures.

DUTCH 204 Intermediate Composition and Conversation
Fall. 3 credits. Prerequisite: Dutch 203 or permission of instructor. M. Briggs.
This course aims to emphasize written and oral application of accurate, idiomatic Dutch. Reading of authentic material of newspapers, literature, and history, with emphasis on Dutch seventeenth-century culture and its influence on the Americas. Taught in Dutch.

English
Intensive English Program, see p. 525.
Fees. A small fee may be charged for photocopied texts for course work.

ENGLF 205 English as a Second Language
Fall. 4 credits. Prerequisite: placement by examination. S. Schaffzin.
An all-skills course emphasizing listening and speaking, with some writing practice. Students also meet individually with the instructor.

ENGLF 206 English as a Second Language
Spring. 3 credits. Prerequisite: English 205 or placement by examination. S. Schaffzin.
Designed for those who have completed English 205 and who require or desire further practice, particularly in writing. Individual conferences are also included.

ENGLF 209 English as a Second Language
Fall or spring. 1 credit. Prerequisite: placement by examination. S. Schaffzin.
Practice in classroom speaking and in informal conversational English as a means of gaining information. Students also practice giving informal presentations. Individual conferences with the instructor supplement class work.

ENGLF 210 English as a Second Language
Spring. 1 credit. Prerequisite: placement by examination. S. Schaffzin.
Practice in academic speaking. Formal classroom discussion techniques and presentation of information in various forms. Individual conferences supplement class work.

ENGLF 211 English as a Second Language
Fall, spring, or summer. 3 credits. Prerequisite: placement by examination. D. Campbell.
Academic writing with emphasis on improving organization, grammar, vocabulary, and style through the writing and revision of short papers relevant to students' fields. Frequent individual conferences supplement class work.

ENGLF 212 English as a Second Language
Spring. 3 credits. Prerequisite: English 211 or placement by examination. D. Campbell.
Research paper writing. Students work on one project, for example, a research paper on a topic of their choice: a thesis proposal, pre­thesis, or part of a thesis such as the literature review or a paper for another course (permission of the instructor is mandatory). Course work involves practice in paraphrase, summary, the production of cohesive, coherent prose, vocabulary use, and gram­matical structure. Frequent individual conferences supplement class work. Separate
sections for Social Sciences/Humanities and for Science/Technology.

ENGLF 213 Written English for Non-Native Speakers
Spring. 3 credits. Prerequisite: placement by examination. S. Moore.

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. Individual conferences supplement class work.

Freshman Writing Seminar
ENGLB 215-216 English for Later Bilinguals
For description, see freshman writing seminar brochure.

Ewe
See listings under Africana Studies and Research Center.

French
A. Cohn (director of undergraduate studies, 216 Morrill Hall, 255–3073), L. R. Waugh.

For information on language placement and transfer credit, contact C. Waldron (403 Morrill Hall, 255–0702). For literature and advanced language courses see Romance Studies.

The Major
The French major has two separate tracks, the literature track and the linguistics track. The linguistics track is described here; for the literature track, see the description under Romance Studies. The major in French linguistics, is designed to give students proficiency in the oral and written language and to develop skills in the linguistic analysis of French.

While prospective majors should try to plan their programs as far ahead as possible, no student will be refused admission merely because of a late start. It is even possible for a student to begin the French and/or linguistics at Cornell and become a major. Students wishing to major in French linguistics should consult Professor Linda Waugh, who will advise them.

The French Linguistics Major
To be admitted to the major, students should have completed Linguistics 101 and French 200, 203, 205 or 213 (or their equivalents) by the end of the sophomore year. It is expected that all students in the major will also take either French 220, 221 or 222, preferably by the end of the sophomore year.

To complete the major, a student must:
1) acquire a sound degree of competence in French. This competence is demonstrated by the successful completion of French 312 (or its equivalent) and by the passing of a special examination. Typically, students in the major will have taken 312 by the end of their junior year.
2) take six courses in French, Romance, and general linguistics (in addition to Linguistics 101). These courses will include at least one course concerning the history of French (e.g., French 401), Romance linguistics 323, French 629 (listed under Romance Studies), one course concerning the structure of French (e.g., French 408, 410, 604, Linguistics 322), and one other course in French linguistics.
3) take two courses (preferably a sequence) in some allied area, for example, (a) French literature and civilization, (b) psycholinguistics, (c) philosophy of language, (d) French history, culture, music, or history of art or architecture. This requirement may be waived for students who are double majors in other fields.

Study Abroad in France
French majors or other interested students may study in France or in other European countries during their junior year. Opting for one of several study-abroad plans recognized by the departments of Romance Studies and Modern Languages and Linguistics facilitates the transfer of credit. Information about these plans is available from Jacques Béreaud, director of undergraduate studies, Department of Romance Studies. (See the description of the program in Paris sponsored by Cornell under the Department of Romance Studies.)

Study Abroad in Geneva
French majors or other students with a commitment to international experience may study abroad in Geneva, Switzerland. Geneva is an especially appropriate location for students who have an interest in international affairs, as many international organizations maintain offices there, among them the United Nations, the Red Cross, the headquarters of the World Health Organization, the International Labor Organization, the International Telecommunications Union, the World Intellectual Property Organization, the European Nuclear Research Center, and the Ecumenical Center at Grand-Saconnex. Cornell students enroll full-time in the University of Geneva, where they take year-long courses in conjunction with Swiss students. They can choose classes in many subjects, including literature, economics and other social sciences, medicine, psycholinguistics, education, architecture, physical education, and French language, civilization, and history.

Interested students can participate in internships at international organizations, and qualified participants may be able to work under the direction of officials on research studies that are of mutual interest. The University of Geneva offers four consecutive three-week language and civilization summer courses beginning in mid-July, which prepare students for the mandatory French exam given in early October. Cornell students must attend the last of these sessions, from mid-September to early October, but earlier sessions are recommended for students who need additional language preparation.

Students must be Cornell undergraduates with a strong academic record. The minimum French preparation is the completion of French 204 or 213, or its equivalent in advanced credit or placement by the Cornell C.A.S.E. examination. Students should plan to study abroad for the entire academic year. Students interested in the study abroad program in Geneva should contact the Cornell Abroad office for further information.

Honors. The honors program encourages well-qualified students majoring in French linguistics to do independent work in French outside the structure of courses. The preparation of the senior honors essay, generally spread over two terms, provides a unique learning opportunity, since it allows for wide reading, and extensive rewriting to a degree not practically possible in the case of course papers.

No special seminars or courses are required of honors students, but they will have regular meetings with the faculty advisers who have agreed to supervise their work. They may receive course credit by enrolling in French 429–430, but these independent study courses must be taken in addition to the courses that meet the minimum for the major. At the end of the senior year each honors student is examined orally on the honors essay by a jury consisting of his or her faculty adviser and two other faculty members. The awarding of honors is determined by the student's grades in the major and the quality of the honors essay.

Fees. Depending on the course, a small fee may be charged for copies of texts for course work.

FRDML 101 Basic Course I
Summer only. 6 credits.

An introductory course offering opportunities for student interaction and intensive practice in listening to, speaking, reading, and writing basic French in meaningful contexts. Students who have previously studied French must take the placement examination or receive permission from the instructor before registering for this course.

FRDML 121 Elementary French
Fall or spring. 4 credits. Prerequisite: French 121 or CPT or PPT score between 370 and 440. Students who receive an FPT score of 560 after French 122 attain qualification and may enter the 200-level sequence; otherwise, satisfactory completion of French 123 is required for qualification. M. J. Davis.

The goal of French 122 is to build on the students' elementary knowledge of French so that they can function in basic situations in a French-speaking culture. Sections continue to provide intensive, context-specific practice in speaking, listening, reading, and writing. Lectures address cultural and linguistic issues.

FRDML 122 Elementary French
Fall or spring. 4 credits. Prerequisite: French 121 or CPT or PPT score between 370 and 440. Students who receive an FPT score of 560 after French 122 attain qualification and may enter the 200-level sequence; otherwise, satisfactory completion of French 123 is required for qualification. M. J. Davis.

The goal of French 122 is to build on the students' elementary knowledge of French so that they can function in basic situations in a French-speaking culture. Sections continue to provide intensive, context-specific practice in speaking, listening, reading, and writing. Lectures address cultural and linguistic issues.

FRDML 123 Continuing French
Fall, spring, or summer. 4 credits. Limited to students who have previously studied French and have a CPT or PPT score between 450 and 550. Satisfactory completion of French 123 fulfills the qualification portion of the language requirement. A. Grandjean-Levy.

French 125 is an all-skills course designed to improve pronunciation, oral communication, and reading ability; to establish a groundwork for correct writing; and to provide a substantial grammar review. The approach in the course encourages the student to see a foreign language as something more than a bunch of skills to be memorized. The course features...
authentic texts, a functional grammar, and exchange students from France who visit the sections.

FRDML 200 Intermediate Reading and Writing
Fall or spring. 3 credits. Prerequisite: qualification in French (French 123 or CPT or FPT score 560–640). Satisfactory completion of French 200 fulfills the proficiency portion of the language requirement. C. Sparfel.

A language course based on contemporary sections. Exchange students from France who visit the Taught in French.

conversation, composition, and reading. Improved control of French grammatical structure and vocabulary through guided authentic texts, a functional grammar, and seminars for fields of interest is offered.

FRDML 203 Intermediate Composition and Conversation I
Fall, spring, or summer. 3 credits. Prerequisite: qualification in French (French 123 or CPT or FPT score 560–640). Satisfactory completion of French 203 fulfills the proficiency portion of the language requirement. I. Daly.

Improved control of French grammatical structure and vocabulary through guided conversations, composition, and reading. Lectures include grammar review, videos on current topics, and cultural presentations. Taught in French.

[FRDML 205 Intermediate French: le francais multicolore @
Spring. 3 credits. Prerequisite: qualification in French (French 123 or CPT or FPT score of 560–640). Satisfactory completion of French 205 fulfills the proficiency portion of the language requirement and can be used to satisfy the breadth requirement. Not offered 1995–96. C. Waldron.

Opportunities to strengthen and expand active language skills within the context of the wider French-speaking world. Contemporary readings, video and audio materials, and people from Francophone countries of Europe, Africa, and the Americas will provide bases for individual and group projects. Taught in French.]

FRDML 213 Intermediate Composition and Conversation II
Fall, spring, or summer. 3 credits. Enrollment limited. Prerequisite: proficiency in French (French 200, 203, or 205), permission of instructor, or placement by Cornell Advanced Standing Examination (CASE) offered by the Department of Modern Languages and Linguistics. This course, or its equivalent, is required for admission to the Cornell Abroad program. C. Waldron.

Emphasis on improving oral and written expression of accurate, idiomatic French along with enrichment of vocabulary and treatment of specific problems of grammar. Contemporary readings, newspaper articles on current events, television news, movies, and guest speakers will provide a basis for the courses content. (Vocabulary emphasis on the elements according to section.) Taught in French.

FRDML 232 The French Language Today (also Ling 232)
Fall. 3 credits. Prerequisite: Linguistics 101. A. Cohn.

Designed for students with a working knowledge of French, this course explores the structure of French and how it is used. The course investigates the sound system, word structure and sentence structure of French as well as different varieties of French, including regional and social variation and formal vs. informal differences.

FRDML 303 French through Current Events
Fall. 4 credits. Limited to 14 students. Prerequisites: Q++ on CASE exam, FRDML 213, or permission of instructor. A. Grandjean-Levy.

All-skills course. Current events, contemporary French political, social, and cultural life constitute the medium in which the language is studied. Students will subscribe to two French weeklies and watch daily French satellite news broadcasts. An e-mail account is necessary as certain information will be accessed through Internet. Some research on issues related to the news will be required for essays, papers, and production of a TV news broadcast.

FRDML 305 French through Film
Fall and spring. 4 credits. Prerequisites: Q++ on CASE exam, FRDML 213, or permission of instructor. C. Waldron.

Analysis of French contemporary films and related readings. Used as a means of studying the language. Particular emphasis on the culture and historical context as it relates to French contemporary society. Additionally, guest speakers will provide enrichment on selected topics.

[FRDML 401 History of the French Language #
Fall. 4 credits. Prerequisite: qualification in French and Linguistics 101, or permission of instructor. Offered alternate years. Not offered 1995–96. Staff.

Diachronic development of French from Latin, with emphasis on phonological and morphological change. Course work includes problems in reconstruction, textual analyses, discussions of theoretical topics, and external history.
]

FRDML 405 Contemporary Theories of French Grammar
Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years. L. Waugh.

Selected readings of twentieth-century French linguistics.

[FRDML 407 Applied Linguistics: French
Fall. 4 credits. Prerequisite: qualification in French. Offered alternate years. Not offered 1995–96. Staff.

Designed to equip the student with the ability to apply linguistic descriptions in teaching French, with special emphasis on phonetics and morphology.
]

FRDML 408 Linguistic Structure of French I (also Linguistics 408)
Fall. 4 credits. Prerequisites: qualification in French and Linguistics 101 or Linguistics 400, or permission of instructor. Offered alternate years. Not offered 1995–96. Staff.

A synchronic study and analysis of modern French, with emphasis on its phonology and morphology.

[FRDML 410 Linguistic Structure of French II
Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years. Not offered 1995–96. Staff.

A synchronic study and analysis of modern French, with emphasis on its phonology, pragmatics, and discourse analysis.
]

FRDML 630 French for Reading—Graduate Students
Spring and summer. 3 credits. Limited to graduate students. Designed for those with little or no background in French, this course's primary aim is to develop skill in reading French. Grammar basics, extensive vocabulary, and strategies for reading in a foreign language are covered. Some flexibility in selecting texts according to fields of interest is offered.

FRDML 700 Seminar in French Linguistics
Spring, according to demand. Credit to be arranged.

Seminars are offered according to faculty interest and student demand. Topics in recent years have included current theories in French phonology, current theories in French syntax, and semantics of French.

German

W. Harbert, (director of undergraduate studies, 210 Morrill Hall, 255-8441), J. H. Jasanoff. For literature courses see German Studies.

The German Major
See German Studies.

Study Abroad
Cornell has a formal agreement with the University of Hamburg enabling its undergraduates to take courses in any field offered by the German university. The program offers a challenging course of study and the experience of total immersion in German life and culture. Participants in this program attend a required 3-credit orientation course in September, which is designed to help them adjust to the academic and social life of Germany. Special field trips are organized as part of the orientation session. Beginning in mid-October, students enroll as fully matriculated students at the University of Hamburg.

Cornell maintains a center in Hamburg with appropriate support staff. The resident director is a faculty member from Cornell, who teaches a special seminar each semester, provides academic advice, and helps ensure the quality of the courses. The center, which includes a classroom, a small library, and word-processing facilities, is used by students for the orientation session, special seminars, tutorials, lectures, and informal gatherings.

Applicants are expected to have attained at least proficiency in German prior to departure. Students are strongly encouraged to study abroad for the entire year rather than for one semester. For further information, applicants should contact W. Harbert, director of undergraduate studies, Department of Modern Languages and Linguistics (210 Morrill Hall, 255-8441), and the Cornell Abroad Office (474 Uris Hall, 255-6224).

German Area Studies Major
See German Studies.

Honor. The honors program in German is open to superior students who want to work independently in an area of their own choice. Students are free to select any faculty member of the Field of Germanic Studies (in the case of area studies majors, the appropriate member of their committee) to assist them in designing their honors program, to supervise
their work, and to help them select a suitable topic for an honors essay. The independent study courses, German 451 and 452, may form part of the program.

**Freshman Writing Seminar Requirement**

See German Studies.

**Fees.** Depending on the course, a small fee may be charged for photocopied texts for course work.

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>GERLA 101</td>
<td>German Basic Course I</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>GERLA 121-122</td>
<td>Elementary German</td>
<td>4 (Fall), 122, 2 spring</td>
<td>4 credits each term. Prerequisite for German 122. German 121 or equivalent. Intended for beginners or students placed by examination. Students who obtain a CPT score of 560 after German 121-122 attain qualification and may enter the 200-level sequence; otherwise German 123 is required for qualification. D. McGraw. A thorough grounding in all the language skills: listening, speaking, reading, and writing. Language practice in small groups. Lecturers cover grammar, reading, and cultural information.</td>
</tr>
<tr>
<td>GERLA 123</td>
<td>Continuing German</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>GERLA 203</td>
<td>Intermediate Composition and Oral Conversation</td>
<td>3</td>
<td>Prerequisite: qualification in German (German 123 or CPT score of 560-640). G. Lischke. Conversation: review of selected points of grammar; composition; reading of literary and non-literary texts; discussion of current events, videos; and group projects emphasis on development of accurate and idiomatic expression. Fullfills language proficiency requirement.</td>
</tr>
<tr>
<td>GERLA 204</td>
<td>Intermediate Composition and Oral Conversation</td>
<td>3</td>
<td>Prerequisite: German 203 or permission of instructor. G. Valk. Emphasis on improving oral and written expression of idiomatic German. Enrichment of vocabulary and appropriate use of language in conversational context. Material consists of readings in contemporary prose, articles on current events, a novel, discussion of videos and group projects, treatment of specific grammar issues, and computer assisted instruction in writing.</td>
</tr>
<tr>
<td>GERLA 302-304</td>
<td>Advanced Composition and Oral Conversation</td>
<td>4 (Fall), 304, spring</td>
<td>4 credits each term. Prerequisite for German 303: German 204 or equivalent. Prerequisite for German 304: German 303 or equivalent. G. Valk. Emphasis in increasing the students' oral and written command of German. Study of the language in different text types, such as newspaper, magazines, and two novels. Discussion of current events and literary texts provides background on the history, politics, and social conflicts of German-speaking countries. 304: Course materials include DIE ZEIT, other German newspaper/magazine articles, and two contemporary novels. Emphasis on vocabulary development pertinent to issues of today's German-speaking countries. Students have the opportunity to research material for class presentation, lead discussions, and share their interests/special fields with the group.</td>
</tr>
<tr>
<td>GERLA 306</td>
<td>Zeitungsdéutsch</td>
<td>4</td>
<td>Prerequisite: German 304 or equivalent. D. McGraw. Analysis of various German daily and weekly newspapers with special emphasis on stylistic differences in journalism; discussion of current events. Students have the opportunity to research material for class presentation, lead discussions, and share their interests/special fields with the group.</td>
</tr>
<tr>
<td>GERLA 401</td>
<td>Introduction to German Linguistics</td>
<td>4</td>
<td>Prerequisite: Linguistics 101 or permission of instructor. Not offered 1995-96. W. Harbert. Survey of major issues in historical Germanic linguistics.</td>
</tr>
<tr>
<td>GERLA 402</td>
<td>History of the German Language #</td>
<td>4</td>
<td>Prerequisite: German 204 and Linguistics 101 or permission of instructor. Offered alternate years. Not offered 1995-96. W. Harbert. Phono logical, morphological, syntactic, and semantic developments from pre-Old High German times to the present.</td>
</tr>
<tr>
<td>GERLA 404</td>
<td>Modern German Syntax</td>
<td>4</td>
<td>Prerequisite: German 304 or equivalent, and Linguistics 101 or 303. M. Diesing. An application of selected theoretical syntactic models to problems in the syntax of modern German.</td>
</tr>
<tr>
<td>GERLA 407</td>
<td>Teaching German as a Foreign Language</td>
<td>2</td>
<td>G. Lischke, D. McGraw. This course has been designed to familiarize students with current ways of thinking in the field of applied linguistics and language pedagogy. It introduces different concepts of foreign language methodology as well as presents and discusses various techniques as they can be implemented in the foreign language classroom. Special consideration is given topics such as planning syllabi, writing classroom tests, and evaluating student's performance.</td>
</tr>
<tr>
<td>GERLA 602</td>
<td>Gothic</td>
<td>4</td>
<td>Prerequisite: Linguistics 101. Offered alternate years. W. Harbert. Linguistic structure of Gothic, with extensive readings of Gothic texts.</td>
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<tr>
<td>GERLA 603</td>
<td>Old High German, Old Saxon</td>
<td>4</td>
<td>Prerequisite: Linguistics 101. Offered alternate years. Not offered 1995-96. W. Harbert.</td>
</tr>
<tr>
<td>GERLA 605</td>
<td>Structure of Old English</td>
<td>4</td>
<td>Prerequisite: German 401. Offered alternate years. W. Harbert. Linguistic overview of Old English, with emphasis on phonology and syntax.</td>
</tr>
<tr>
<td>GERLA 606</td>
<td>Topics in Historical Germanic Morphology</td>
<td>4</td>
<td>Prerequisite: German 401. Staff. The development of the sound system from Proto-Germanic to its daughter languages.</td>
</tr>
<tr>
<td>GERLA 609-610</td>
<td>Old Norse</td>
<td>4</td>
<td>Prerequisite: Linguistics 401 and German 123 or permission of instructor. Fall; 4 credits each term. Staff. Study of the linguistic structure of Old Norse, with extensive reading of Old Norse texts.</td>
</tr>
<tr>
<td>GERLA 611</td>
<td>Readings in Old High German and Old Saxon</td>
<td>4</td>
<td>Prerequisite: German 653 or equivalent. W. Harbert. A diachronic and comparative investigation of syntactic processes in the older Germanic languages.</td>
</tr>
<tr>
<td>GERLA 631-632</td>
<td>Elementary Reading I, II</td>
<td>3</td>
<td>Limited to graduate students. Prerequisite for German 632: German 631 or equivalent. G. Appel. Two-course sequence specifically designed to help students acquire German for reading academic texts from various disciplines. Orientation is toward developing reading strategies, building vocabulary, and utilizing knowledge of text structure to facilitate text understanding. The majority of reading materials will be selected on the basis of individual needs and interests of the participants in the course. (For a description of summer course, consult summer catalog).</td>
</tr>
<tr>
<td>GERLA 710</td>
<td>Seminar in Germanic Linguistics</td>
<td>4</td>
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<tr>
<td>GERLA 720</td>
<td>Seminar in Comparative Germanic Linguistics</td>
<td>4</td>
<td>Prerequisite: Linguistics 401. Offered alternate years to the needs of students and to the limitations of staff time. 4 credits. Not offered 1995-96. W. Harbert.</td>
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<tr>
<td>GERLA 720</td>
<td>Seminar in Comparative Germanic Linguistics</td>
<td>4</td>
<td>Prerequisite: Linguistics 401. Offered alternate years to the needs of students and to the limitations of staff time. 4 credits. Not offered 1995-96. W. Harbert. Topics include phonology, morphology, syntax, and dialectology of the older Germanic languages.</td>
</tr>
</tbody>
</table>
HINDI 101-102 Elementary Hindi-Urdu  
101, fall; 102, spring. 6 credits each term. Prerequisite for Hindi-Urdu 102: Hindi-Urdu 101 or equivalent. C. Fairbanks.
A semi-intensive course for students without prior experience in Hindi-Urdu or a closely related language. A thorough grounding is given in all language skills: listening, speaking, reading, and writing. Completion of this sequence, including satisfactory performance on an examination given at the end of 110, will constitute a level of performance equal to that of the 101-102 sequence, and will thus be considered to fulfill qualification for the language requirement.

Note: For complete descriptions of courses numbered 600 and above, consult the appropriate instructor.

[GERLA 730 Seminar in German Linguistics  
Fall or spring, subject to the needs of students and the limitations of staff time. 4 credits. Not offered 1995-96.
Selected topics including the history, structure, and dialects of German.]

Modern Greek  
See listings under Classics.

Modern Hebrew  
See listings under Near Eastern Studies.

Hindi  
Fees. A small fee may be charged for photocopied texts for course work.

HINDI 102-103 Elementary Hindi-Urdu  
102, fall; 103, spring. 3 credits each term. Prerequisite for Hindi-Urdu 103: Hindi-Urdu 102 or equivalent. C. Fairbanks.
A semi-intensive course for students without prior experience in Hindi-Urdu or a closely related language. A thorough grounding is given in all language skills: listening, speaking, reading, and writing. Completion of this sequence, including satisfactory performance on an examination given at the end of 110, will constitute a level of performance equal to that of the 101-102 sequence, and will thus be considered to fulfill qualification for the language requirement.

Note: For complete descriptions of courses numbered 600 and above, consult the appropriate instructor.

[HINDI 201-202 Intermediate Hindi Reading @  
201, fall; 202, spring. 3 credits each term. Prerequisites: for Hindi 201, Hindi 102; for Hindi 202, Hindi 201 or permission of instructor. Not offered 1995-96. C. Fairbanks.]

[HINDI 203-204 Intermediate Composition and Conversation @  
203, fall; 204, spring. 3 credits each term. Prerequisites: for Hindi 203, Hindi 102; for Hindi 204, Hindi 203 or permission of instructor. C. Fairbanks.
Throughout this course sequence all aspects of language learning are practiced: listening, speaking, reading, and writing. In 203 video materials are used and the emphasis is on the conversational aspect of the language. In 204 the focus shifts to reading skills, and the main text used is a popular novel.

[HINDI 301-302 Advanced Readings in Hindi Literature @  
301, fall; 302, spring. 4 credits each term. Prerequisites: for Hindi 301, Hindi 202; for Hindi 302, Hindi 301 or equivalent. Not offered 1995-96. C. Fairbanks.
Selected readings in modern Hindi literature.]

[HINDI 303-304 Advanced Composition and Conversation @  
303, fall; 304, spring. 4 credits each term. Prerequisites: for Hindi 303, Hindi 204 or equivalent; for Hindi 304, Hindi 303 or equivalent. C. Fairbanks.

[HINDI 305-306 Advanced Hindi Readings @  
305, fall; 306, spring. 4 credits each term. Prerequisites: for Hindi 305, Hindi 202 or equivalent; for Hindi 306, Hindi 305 or equivalent. Not offered 1995-96.

Note: For complete descriptions of courses numbered 600 and above, consult the appropriate instructor.

[HINDI 700 Seminar in Hindi Linguistics  
Fall or spring. 3 credits. Prerequisite: permission of instructor. Not offered 1995-96.

Hungarian  
Fees. A small fee may be charged for photocopied texts for course work.

[HUNGR 131-132 Elementary Hungarian  
131, fall; 132, spring. 3 credits each term. This language series cannot be used to satisfy the language requirement. Not offered 1995-96.

Indonesian  
For students who have completed Indonesian 121-122 or its equivalent there is the option of a one-semester program in Malang, East Java, during the junior year. The program combines a variety of cultural and artistic options with area course work and advanced language study. Complete information is available through Cornell Abroad.

Students who have completed a minimum of 18 credits or the equivalent are eligible to apply for a summer program in the Advanced Indonesian Abroad Program. Further information is available from Professor John Wolff (307 Morrill Hall, 255-0733).

Fees. A small fee may be charged for photocopied texts for course work.

[INDO 203-204 Intermediate Composition and Conversation  
203, fall; 204, spring. 3 credits each term. Prerequisites: for Indonesian 203, Indonesian 123; for Indonesian 204, Indonesian 203 or permission of instructor. J. Wolff and staff.]

[INDO 305-306 Directed Individual Study  
305, fall; 306, spring. 2-4 credits. Prerequisite: Indonesian 301-302 and 303-304 or equivalent knowledge of Indonesian or Malay. J. Wolff. A practical language course on an advanced level in which the students will read materials in their own field of interest, write reports, and meet with the instructor for two hours a week for two credits and twice a week for four credits.]

[INDO 401-402 Advanced Readings in Indonesian and Malay Literature  
401, fall; 402, spring. 4 credits each term. Prerequisites: for Indonesian 401, Indonesian 302 or equivalent; for Indonesian 402, Indonesian 401 or equivalent. Not offered 1995-96. J. Wolff and staff.]

FALCON (Fall-year Asian Language Concentration)  

INDO 161-162 Intensive Indonesian  
161, fall; 162, spring. 16 credits each term. Prerequisite: permission of instructor.

Related Course  
Seminar in Austronesian Linguistics (Linguistics 655-656).

Italian  
C. Rosen.
For literature courses see Romance Studies.
The Italian Major

See Romance Studies.

Study Abroad in Italy

Italian majors may study in Italy, generally during their junior year, under any of those study-abroad plans organized by American universities that allow the transfer of grades and credit, such as the Cornell program in Rome.

The College of Architecture, Art, and Planning maintains a program open to all qualified students attending Cornell. The program is housed in the sixteenth-century Palazzo Massimo, designed by architect Baldassare Peruzzi, on the Corso Vittorio Emanuele, in the heart of Rome. Students may enroll for a semester in the fall or spring. Courses regularly taught at the Palazzo Massimo include: Architecture 300, 401, 402, 500, 502, Design Studio; Architecture 338 and 399, Special Topics in Architectural History; Architecture 458, Special Projects in Design Communications; Architecture 507, Contemporary Italian Culture; Architecture 510, Thesis Introduction; Art 251, 311, 322, and 371; and History of Art 371, Renaissance and Baroque Art in Rome; Italian 111, 112, elementary Italian 111 and 112 correspond to Cornell courses 121 and 122 respectively (see below). Students having passed 111 in Rome will be admitted to 122 when they get back to Cornell. Students having passed 112 in Rome will be granted credit but must take the Italian Skills Assessment of the language requirement and for placement into more advanced courses upon their return to Cornell. More advanced Italian classes in Rome are also being organized.

To be eligible, students must have completed the first two years of their curriculum requirements and be in good academic standing.

Fees. Depending on the course, a small fee may be charged for copies of texts for course work.

ITALA 101 Basic Course I

Summer only. 6 credits.

A thorough grounding in all basic language skills. Students who have previously studied Italian must take the placement examination before registering for this course.

ITALA 121-122 Elementary Italian

121, fall, 122, spring. 4 credits each term. Prerequisites: Italian 122: Italian 121 or equivalent. Intended for beginners or students placed by examination. At the end of Italian 122, students who score 500 or higher on the Italian Skills Assessment attain qualification and may enter the 200-level sequence; otherwise Italian 123 is required for qualification. K. Battig.

A thorough grounding in all the language skills: listening, speaking, reading, and writing. Language is taught in small groups. Lectures cover grammar and cultural information.

ITALA 123 Continuing Italian

Fall. 4 credits. Limited to students who have previously studied Italian and score between 450 and 550 on the Italian Skills Assessment. Satisfactory completion of Italian 122 fulfills the qualification portion of the language requirement. J. Scarpetta.

Italian 123 is an all-skills course designed to improve speaking and reading ability, to establish a groundwork for correct writing, and to provide a substantial grammar review.

ITALA 203-204 Intermediate Composition and Conversational Skills

203, fall or spring, 204, fall or spring. 3 credits each term. Prerequisites: for Italian 203, qualification in Italian; for Italian 204, previous enrollment in ITALA 203. 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. ITALA 201 for description of this course, which may be taken concurrently with the ITALA 203-204 language courses described above. The introductory literature courses are offered by the respective literature departments, and the 203-204 language courses by the Department of Modern Languages and Linguistics.

ITALA 313 Advanced Italian: Language and Social Issues

Fall. 3 credits. Prerequisite: Italian 204 or equivalent. ITALA 313 is not prerequisite to ITALA 314 and may be taken after ITALA 314.

Further development of all skills. Readings and discussions center on two themes: (1) contemporary Italian life and (2) the Italian language, its origins, evolution, and present state, including the role of the dialects. Emphasis on vocabulary building and awareness of stylistic levels.

ITALA 314 Advanced Italian: Language and Social Issues

Fall. 3 credits. Prerequisite: Italian 204 or equivalent. ITALA 314 is not prerequisite to ITALA 314 and may be taken after ITALA 314.

Further development of all skills, with emphasis on self-expression. Content: evolution and crisis in Italian politics, values, and national identity against the background of European unification. Social movements, issues, and attitudes, especially as reflected in the mass media.

ITALA 403 Linguistic Structure of Italian

Fall. 4 credits. Prerequisites: Linguistics 101 or equivalent, and qualification in any Romance language. Offered alternate years. Not offered 1995-96.

Survey of Italian syntax, using simple theoretical tools to bring hidden regularities to light. Topics include auxiliaries, modalics, reflexive constructions, agreement, impersonal constructions, causatives.

ITALA 404 History of the Italian Language

Spring. 4 credits. Prerequisites: Linguistics 312 and either Italian 201 or 205 or equivalent offered alternate years. Not offered 1995-96.

Overview of Italian and its dialects from the earliest texts to the present day. Emergence of the standard language. External history and sociolinguistic circumstances.

ITALA 631 Readings in Italian Opera

Spring. 2 credits. For graduate students only. Prerequisite: permission of instructor. Offered concurrently with appropriate seminars in the Departments of Music. Not offered 1995-96.

Japanese

For literature courses see Asian Studies.

Fees. A small fee may be charged for photocopied texts for course work.

JAPAN 101-102 Elementary Japanese

101, fall; 102, spring. 6 credits each term. Prerequisites: for Japanese 102: Japanese 101 or placement by the instructor during registration. Intended for beginners or those who have been placed in the course by examination. Y. Nakanishi, J. Zeserson.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

JAPAN 123 Accelerated Introductory Japanese

Fall. 6 credits. Prerequisites: placement by the instructor at beginning of semester. 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. Attend Japan 101 lectures.

JAPAN 201-202 Intermediate Japanese

Reading I @

201, fall, 202, spring. 2 or 3 credits each term. Students currently taking Japanese 203 and 204 register for 2 credits and attend the W drill and the F lecture; other students register for 3 credits (with permission of instructor) and attend the W drill and the M, W, F lectures. Prerequisites: for Japanese 201, Japanese 102 or placement by the instructor during registration; for Japanese 202, Japanese 201 and 204 or placement by the instructor during registration. Y. Kawasaki.

Reading of elementary texts emphasizing practical materials, with development of writing skills.

JAPAN 203-204 Intermediate Japanese

Conversation @

203, fall and summer; 204, spring and summer. 4 credits each term. Prerequisites: for Japanese 203, Japanese 102 or placement by the instructor during registration; for Japanese 204, Japanese 203, 205, or 223, or placement by the instructor during registration. Y. Kawasaki.

Training in listening and speaking for students who have acquired basic oral proficiency. Students are strongly encouraged to enroll in Japanese 201-202 concurrently.

JAPAN 301-302 Intermediate Japanese

Reading II @

301, fall, 302, spring. 4 credits each term. Prerequisites: for Japanese 301, Japanese 202 or placement by the instructor during registration; for Japanese 302, Japanese 301 or placement by the instructor during registration. K. Selden.

Reading of selected modern texts with emphasis on expository style.

JAPAN 303-304 Communicative Competence @

303, fall, 304, spring. 3 credits each term. Prerequisites: for Japanese 303, Japanese 204 or placement by the instructor during registration; for Japanese 304, Japanese 303 or placement by the instructor during registration. Y. Katagiri.

Drill in the use of spoken Japanese within the constraints set by Japanese social settings.
JAPAN 341-342 Advanced Japanese for Business Purposes  
For description, see JAPAN 545.

JAPAN 401-402 Advanced Japanese Reading  
401, fall; 402, spring. 4 credits each term.  
Prerequisites: for Japanese 401, Japanese 302 or placement by the instructor during registration; for Japanese 402, Japanese 401 or placement by the instructor during registration. Y. Kawasaki, K. Selden.  
Reading of selected modern texts with emphasis on expository style. One section of Japanese 401-402 specializes in business/social science materials. Consult with Y. Kawasaki.

JAPAN 404 Linguistic Structure of Japanese  
Fall. 4 credits. Prerequisites: Japanese 102 or permission of instructor; and Linguistics 101, or equivalent introductory course in linguistics. Offered alternate years. J. Whitman.  
Introduction to the linguistic study of Japanese, with an emphasis on morphology and syntax.

JAPAN 407-408 Oral Narration and Public Speaking  
407, fall; 408, spring. 2 credits each term.  
Prerequisites: for Japanese 407, Japanese 304 or placement by the instructor during registration; for Japanese 408, Japanese 407 or placement by the instructor during registration. S. Ohki.  
Instruction in storytelling, lecturing, and speechmaking, with emphasis on the construction of discourse and Japanese patterns of oral delivery.

JAPAN 410 History of the Japanese Language  
Fall. 4 credits. Prerequisite: permission of instructor. Offered alternate years. J. Whitman.  
An overview of the history of the Japanese language followed by intensive examination of issues of interest to the participants. Students should have a reading knowledge of Japanese.

JAPAN 421-422 Directed Readings  
421, fall; 422, spring. Credit to be arranged. Limited to advanced students and offered according to staff-time availability. Prerequisite: placement by the instructor during registration. K. Selden.  
Topics are selected on the basis of student needs.

JAPAN 543-544 Intermediate Japanese for Business Purposes  
543, fall; 544, spring. 4 credits. For graduate students only. R. Sukle.  
Training in listening and speaking for students who have acquired basic oral proficiency. For students in international business and economics.

JAPAN 545-546 Advanced Japanese for Business Purposes  
For graduate students only, undergraduates register in 341-342. Meets concurrently with Japanese 341-342. R. Sukle.  
This course sequence will offer advanced training in Japanese with concentration on topics relating to the conduct of business. The emphasis will be on spoken skills, with provision for an optional reading component.

FALCON (Full-year Asian Language Concentration)  
R. Sukle, 412 Morrill Hall (255-0734)

JAPAN 160 Introductory Intensive Japanese  
Summer only. 10 credits.  
Introduction to spoken and written Japanese, including extensive drill with native speakers of the language, laboratory work, and lectures by the linguistics faculty on linguistic analysis and language and culture.

JAPAN 161-162 Intensive Japanese (FALCON)  
161, fall; 162, spring. 16 credits each term.  
Prerequisites: for Japanese 161, Japanese 102 or 160 (Cornell summer intensive course) at Cornell, or placement by the instructor during registration; for Japanese 162, Japanese 161 at Cornell or placement by the instructor during registration. Formal application to the program and acceptance is required for admission.

Javanese  
Fees. A small fee may be charged for photocopied texts for course work.

JAVA 131-132 Elementary Javanese  
131, fall; 132, spring. 3 credits each term.  
Prerequisite: for Javanese 132, Javanese 131 or equivalent. J. Wolff and staff.  
An elementary language course for those who have had no previous experience in the language.

JAVA 133-134 Continuing Javanese  
133, fall; 134, spring. 3 credits each term.  
Prerequisites: for Javanese 133, Javanese 132 or equivalent; for Javanese 134, Javanese 133 or equivalent. J. Wolff and staff.  
An intermediate conversation and reading course.

JAVA 203-204 Directed Individual Study  
203, fall; 204, spring. 3 credits. Prerequisite: Javanese 134 or equivalent. J. Wolff and staff.  
This is a practical language course on an intermediate level in which the students will work through readings and conversations under the guidance of a native speaker for three contact hours a week.

Old Javanese  
See Linguistics 651-652.

Khmer (Cambodian)  
Fees. A small fee may be charged for photocopied texts for course work.

KHMER 203-204 Intermediate Composition and Conversation  
203, fall; 204, spring. 3 credits each term.  
Prerequisites: for Khmer 203, Khmer 102; for Khmer 204, Khmer 203. S. Kem.  
Letter writing and other forms of composition.

KHMER 301-302 Advanced Khmer  
301, fall; 302, spring. 4 credits each term.  
Prerequisites: for Khmer 301, Khmer 202 or equivalent; for Khmer 302, Khmer 301. S. Kem.  
Continuing instruction in spoken and written Khmer, emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.

KHMER 401-402 Directed Individual Study  
401, fall; 402, spring. For advanced students. 2–4 credits each term. Prerequisite: permission of instructor. S. Kem.  
Various topics according to need.

(KHMER 403-404 Structure of Khmer  
403, fall; 404 spring. 4 credits each term. Prerequisite: Linguistics 101 or equivalent. Not offered 1995-96. G. Diffloth.  
Introduction to the linguistic study of Khmer.)

Korean  
Fees. A small fee may be charged for photocopied texts for course work.

KOREA 101-102 Elementary Korean  
101, fall; 102, spring. 4 credits each term. H. Diffloth and staff.  
Covers basics of speaking, reading, and writing. Introduces Hangul writing system and rudiments of grammar.

KOREA 109-110 Elementary Reading  
109, fall; 110, spring. 3 credits each term.  
Prerequisite: permission of instructor. Satisfactory completion of Korean 110 will fulfill the qualification portion of the language requirement. H. Diffloth and staff.  
This course is for students who have spoken some Korean in the home, but whose reading and writing skills are basic or nonexistent. If in doubt about eligibility, see instructor.

KOREA 201-202 Intermediate Korean @  
201, fall; 202, spring. 4 credits each term.  
Prerequisite: for Korean 201, Korean 102 or permission of instructor; for Korean 202, Korean 201. H. Diffloth and staff.  
Covers the basics of speaking, reading, and writing at the intermediate level. Introduces some reading and writing with Chinese characters.

KOREA 209-210 Intermediate Reading  
209, fall; 210, spring. 4 credits each term.  
Prerequisite: for Korean 209, Korean 110 or permission of instructor; for Korean 210, Korean 209 or permission of instructor. H. Diffloth and staff.  
An intermediate level of reading comprehension and writing course for students who have acquired basic oral proficiency. Introduces some reading and writing with Chinese characters. If in doubt about eligibility, see instructor.

KOREA 301-302 Advanced Korean  
301, fall; 302, spring. 4 credits each term.  
Prerequisites: for Korean 301, Korean 202 or placement by instructor; for Korean 302, Korean 301 or placement by instructor. H. Diffloth and staff.
Linguistics

Linguistics, the systematic study of human speech, lies at the crossroads of the humanities and the social sciences, and much of its appeal derives from the special combination of intuition and rigor that the analysis of language demands. The interests of the members of the Department of Modern Languages and Linguistics span most of the major subfields of linguistics, phonetics and phonology, the study of speech sounds; syntax, the study of sentence structure; semantics, the study of meaning; historical linguistics, the study of language change in time; sociolinguistics, the study of language as a social and cultural artifact; and applied linguistics, which relates the results of linguistic research to problems of bilingual education, second-language learning, and similar practical concerns.

Studying linguistics is not a matter of studying many languages. Linguistics is a theoretical discipline with ties to such areas as cognitive psychology, philosophy, logic, computer science, and anthropology. Nonetheless, knowing particular languages (e.g., Spanish or Japanese) in some depth can enhance understanding of the general properties of human language. Not surprisingly, then, many students of linguistics owe their initial interest to a period of exposure to a foreign language, and those who come to linguistics by some other route find their knowledge about languages enriched and are often stimulated to embark on further foreign language study.

Students interested in learning more about linguistics and its relationship to other disciplines in the humanities and social sciences are encouraged to take Linguistics 101, which is a prerequisite for most other courses in the field. The Cornell Linguistic Circle, a student organization, sponsors frequent colloquia on linguistic topics; these meetings are open to the university public, and anyone wishing to learn more about linguistics is most welcome to attend.

The Major

For questions regarding the linguistics major, contact A. Cohn (216 Morrill Hall, 255-3073.)

The prerequisite for a major in linguistics is the completion of Linguistics 101 and either Linguistics 201 or 203. The major has its own language requirement, which should be completed as early as possible: qualification in two languages other than English, one of which must be either non-European or non-Indo-European. With approval of the department's director of undergraduate studies, this requirement may be waived (i.e., reduced to the normal arts college language requirement) for students taking the cognitive studies concentration or a double major.

The other requirements for the linguistics major are as follows:

1. Linguistics 201 (Introduction to phonetics and phonology) or Linguistics 203 (Introduction to syntax and semantics), whichever one was not taken as a prerequisite to the major
2. Linguistics 410 (Historical)
3. Three of the following five courses, one of which must be either Phonology I or Syntax I:
   - Linguistics 301 (Phonology I)
   - Linguistics 303 (Syntax I)
   - Linguistics 309 or 310 ( Morphology I or II)
   - Linguistics 319 (Phonetics I)
   - Linguistics 421 (Semantics I)
4. A course at or beyond the 300 level in the structure of English or some other language, or a typological or comparative structure course such as Linguistics 401, or Field Methods.
5. One additional linguistics course for at least 4 credit hours, which may be a course with significant linguistic content in a related field.

Honors.

Applications for honors should be made during the junior year. Candidates for admission must have a 3.0 (B) average overall and should have a 3.2 average in linguistics courses. In addition to the regular requirements of the major, the candidate for honors will complete an honors thesis and take a final oral examination in defense of it. The thesis is usually written during the senior year but may be begun in the second term of the junior year when the student's program so warrants. The oral examination will be conducted by the honors committee, consisting of the thesis adviser and at least one other faculty member in linguistics. Members of other departments may serve as additional members if the topic makes this advisable. Linguistics 493 and 494 may be taken in conjunction with thesis research and writing but are not required.

Distribution Requirement

The distribution requirement in the social sciences may be satisfied by taking Linguistics 101 and (1) any other course in linguistics or (2) any other course offered by the Department of Modern Languages and Linguistics for which this introductory linguistics course is a prerequisite.

Note: See also courses on the structure and history of particular languages or language families listed at the end of this section and cognitive studies for related courses.

Fees:

Depending on the course, a small fee may be charged for photocopied texts for course work.

LING 101 Theory and Practice of Linguistics

Fall, spring, or summer. 4 credits each term. Fall: D. Zec; spring: C. Collins. An introductory course designed to provide an overview of the science of language, especially its theoretical underpinnings, methodology, and major findings. Linguistics 101 plus any other course in linguistics or any DMLL course for which Linguistics 101 is a prerequisite satisfies the social science distribution requirement.

LING 201 Introduction to Phonetics and Phonology

Spring. 4 credits. Prerequisite: Linguistics 101 or equivalent or permission of instructor. A. Cohn. An introduction to the study of human speech sounds and how they pattern in languages. The first part of the course will focus on phonetics: the production, acoustics, and perception of speech, with attention to both the common and the less common sounds of the world's languages. The second part of the course will focus on phonology: how human speech sounds pattern within and across languages, with an emphasis on the rules that govern these patterns and their possible representation.

LING 203 Introduction to Syntax and Semantics

Fall. 4 credits. Prerequisite: Linguistics 101 or equivalent or permission of instructor. M. Diesing.

This course focuses on language as a system of knowledge that enables native speakers to create and interpret the structures of their language. Part of the course will consider issues of syntactic structure, such as the order of constituents, the hierarchical organization of grammars, and syntactic universals. The other part of the course will focus on meaning and interpretation, addressing such issues as the role of context, how information is structured, and how it is encoded in the syntax.

LING 217 History of the English Language

Fall. 4 credits. W. Harbert.

This course explores the development of the English language from its Indo-European beginnings to the present. Topics covered include etymology, grammatical, and lexical exchange, external influences, Old English, Middle English, Standard Englishes, dialects, and world Englishes.

LING 230 Introduction to Southeast Asia Languages and Linguistics

Spring. 3–4 credits variable. For nonmajors or majors. Not offered 1995–96. A. Cohn, J. Wheatley, and J. Wolff. This is a survey of the languages of Southeast Asia. The goal of this course is to expose students to Southeast Asia as a linguistic area and introduce them to the rich language diversity of the region. It includes three main parts: 1) sociolinguistics and ethnolinguistics: issues of language and politics, language and culture, and language use; 2) language structures and typological patterns of the area's languages; characteristic properties of the structure of these languages; 3) historical linguistics, genetic relations between languages, as well as the linguistic effects of language contact and linguistic evidence for prehistory.
LING 232 The French Language Today (also FRDML 232)
Fall. 3 credits. Prerequisite: Linguistics 101. A. Cohn.
This is an introductory course that emphasizes the well as different varieties of French, including regional and social variation and formal vs. informal differences.

LING 235 Introduction to African Languages and Linguistics 0
Fall. 3-4 credits variable. C. Collins.
This is a survey of aspects of language use in Africa. We will discuss the relation between language and culture, the structural characteristics of African languages, and the historical relationships between different African languages.

LING 244 Language Use and Gender Relations (also Women's Studies 244)
Spring. 4 credits. For non-majors or majors. S. McConnell-Ginet.
This course explores connections between language (use) and gender/sex systems, addressing such questions as the following: How do sex and gender affect the ways we speak, the ways we think and evaluate speech? How do sociocultural differences in women's and men's roles affect their language use, their relation to language change? What is meant by sexist language? How does consultation structure the social worlds of women and men? Readings draw from work in linguistics, anthropology, philosophy, psychology, literature, and general women's studies and feminist theory.

LING 264 Language, Mind, and Brain
Fall. 4 credits. For non-majors or majors. Prerequisite: a basic course in linguistics and/or psychology is desirable. Not offered 1995-96. J. Bowers.
An introductory course that emphasizes the formal structure of natural language and its biological basis. The following topics are covered: the formal representation of linguistic knowledge, principles and parameters of universal grammar, the basic biology of language, mechanisms of linguistic performance, the modularity hypothesis, and language and cognition. This course is especially suited for majors in fields such as psychology, philosophy, computer science, and linguistics (and also for those enrolled in the concentration in cognitive studies) who want to take a one-semester introduction to linguistics that concentrates on the formal principles that govern linguistic knowledge, along with some discussion of their biological realization and their use in perception and production.

LING 301-302 Phonology I, II
301: Fall; 302: spring. 4 credits each term. Prerequisites: for Linguistics 301, Linguistics 201 or equivalent; for Linguistics 302, Linguistics 301 or permission of instructor. Fall: D. Zec; spring: A. Cohn.
Basic topics in contemporary phonological theory, which studies the representational structures and principles underlying the human ability to produce and understand spoken language. 301: Adopting a cross-linguistic perspective, develops a conception of phonological representations in which different types of phonological information are arrayed on distinct structural planes. Includes the study of segmental features and their organization, the supra-segmental quantity, and syllable organization. Relations of phonology with morphology, syntax, and phonetics. 302: Using American English as a case study, develops phonological rules and their systematic relations. Principles of syllabification and metrical structure. The organization of the rule system, constraints on rule interaction, lexical and morphological conditioning, and prosodic organization. Evidence for the mental representation of speech; principles of phonological acquisition.

LING 303-304 Syntax I, II
303: fall; 304: spring. 4 credits each term. Prerequisites: for Linguistics 303, Linguistics 205; for Linguistics 304, Linguistics 303 or permission of instructor. Fall: M. Diesing; spring: C. Collins.
303 is an introduction to syntactic theory, with emphasis on the classical theory of transformational grammar. 304 is an advanced course, surveying current models and dealing with such issues as the nature of syntactic representation, levels of representation, principles of universal grammar, and the relation of syntax and semantics.

LING 306 Functional Syntax
Fall. 4 credits. Prerequisite: Linguistics 101 or permission of instructor. Not offered 1995-96. A general survey of syntactic theories that highlight grammatical function and reveal its role in discourse structure.

LING 309-310 Morphology I, II
309: fall; 310: spring. 4 credits each term. Prerequisite: for Linguistics 309; Linguistics 101 or equivalent or permission of instructor; for Linguistics 310: Linguistics 203 or permission of instructor. Fall: V. Carstens; spring: staff.
309 is a general survey focusing on the relationship of meaning and form in morphological analysis. Current research on form-meaning questions is discussed. 310 considers recent discussions in morphological theory, in particular the relationship of morphology and syntax.

LING 311-312 The Structure of English
311: fall; 312: spring. 4 credits each term. Prerequisites: for Linguistics 311, Linguistics 101 or permission of instructor; for Linguistics 312, Linguistics 311 or permission of instructor. Not offered 1995-96. 311 provides an overview of the syntactic structure of English, drawing upon relevant theoretical approaches. 312 deals with phonology, morphology, and special problems of English structure and semantics.

LING 319 Phonetics I
Fall. 4 credits. Prerequisite: Linguistics 201 or permission of instructor. Not offered 1995-96. A. Jongman.
Provides a basic introduction to the study of phonetics. Topics to be covered include anatomy and physiology of the speech production and reproduction of some of the world's sounds, basic acoustics, computerized methods of speech analysis, acoustic characteristics of sounds, speech perception, speech synthesis, stress and intonation.

LING 320 Phonetics II
Fall. 4 credits. Prerequisite: Linguistics 319. A. Jongman.
This course is a continuation of Phonetics I and provides a more detailed survey of some areas in acoustic and articulatory phonetics. Topics include feature theory, vocal tract acoustics, quantal theory, speaker normalization, theories of speech perception, coarticulation, theories of speech production, and prosody. In addition, a number of hands-on projects will be part of the course.

LING 321-322 History of the Romance Languages
Fall: D. Zee; spring: A. Cohn.
This course will deal with some of the fundamental discoveries that have been made in modern linguistics that reveal some fundamental properties of human language and the special human capacity for it, as well as some of the still unsettled questions about it. It will also trace some of the paradigm shifts that have occurred within linguistics, and consider some of the ways in which language has been represented, both within the science of linguistics and outside of it, by contrasting what is known with what is popularly believed to be true. Projected
topics will include: Innateness vs. language as socio-cultural; language variability vs. Universal Grammar: Language change and relatedness of languages; the question of correctness. The class will include, along with a general text, the reading of relevant literature, including original articles and reports of research, class discussion, and student presentations.

LING 366 Spanish in the United States (also Spanish 366)
Fall. 4 credits. Prerequisite: some knowledge of Spanish. Offered alternate years. Attention to aspects of the social distribution requirement.
M. Suter. Examination of major Spanish dialects in the United States from a linguistic perspective. Contrast with the standard language. Borrowing, interference, and code switching. Syntactic, morphological, and phonological characteristics. Sex-related phenomena.

LING 370 Language and Cognition (also Psychology 370)
Spring. 4 credits. Prerequisite: Linguistics 101 or 204 or Psychology 215, or permission of one of the instructors. Not offered same years as Psychology 416. Not offered 1995–96. Examination of current research on selected topics in language from both linguistic and psychological perspectives. Topics may include: Universal Grammar and language acquisition, syntactic parsing, word recognition, sentence production, aphasia, and schizophrenic language.

LING 390 Independent Study in Linguistics
Fall or spring. 1–4 credits variable. Prerequisite: Linguistics 101 or permission of instructor. Staff. Independent study of linguistics topics not covered in regular curriculum for undergraduates.

LING 400 Semiotics and Language (also Comparative Literature 410)
Spring. 4 credits. Prerequisite: some background in language relevant to semiotics: e.g., linguistics, philosophy, psychology, anthropology, or literature: or permission of instructor. L. Waugh. An introduction to the study of semiotics in general and to particular semiotic theories (for example, those of Saussure, Peirce, Jakobson) and to language as a semiotic system. The particular topics to be discussed will depend on the interest of the students.

LING 401 Language Typology
Fall. 4 credits. Prerequisite: Linguistics 101 or equivalent. J. Gair. Study of a basic question of contemporary linguistics: in what ways do languages differ, and in what ways are they all alike? Efforts to formalize universals of syntax and to characterize the nature of constructions available to natural languages. Common morphological devices and their syntactic correlates. Emphasis on systems of case, agreement, and anaphora.

LING 403 Introduction to Applied Linguistics
Spring. 4 credits. Prerequisite: A course in the structure of a language at the 400 level. J. Lantoff. Examination of the theoretical bases of applied linguistics, including second-language learning and current language-teaching methodologies.

LING 405-406 Sociolinguistics
405, fall; 406, spring. 4 credits each term. Prerequisite: Linguistics 101 or permission of instructor. Linguistics 405 is not a prerequisite to 406.
406: Systematically within the interactions between language and social context, we will examine dialect usage (diglossia, multilingualism, code-switching); variation and language change (network theory, change in progress); ethnography of communication and speech acts; language and culture; and language and gender, race and power (incl. pidgins and creoles). 406: This course will be an introduction to the study of pidgin and creole languages and the issues surrounding them both in and beyond linguistics. Topics covered will include: genesis of pidgins and creoles; classification of pidgins and creoles; creoles and language universals; creoles and sociolinguistic variation; a module on Saramaccan Creole English; educational and language planning issues; sociohistorical issues; Black English.

LING 409 Psycholinguistics of Second-Language Reading
Fall. 4 credits. Prerequisite: permission of instructor. G. Appel. In-depth analysis of the research on the reading process in a second language. Topics include processing of narrative vs. expository texts (descriptive, problem solving, causative, etc.); comparison of the reading process in native vs. second language, and development of methodologies for the teaching of reading in the second-language classroom.

LING 410 Introduction to Historical Linguistics
Spring. 4 credits. Prerequisite: Linguistics 201 or permission of instructor. J. Whitman. A survey of the basic mechanisms of linguistic changes, with examples from a variety of languages.

LING 413 Topics in Historical Linguistics
Fall. 4 credits. Prerequisite: Linguistics 410 or permission. Not offered 1995–96. W. Harbert: Historical Linguistics; C. Rosen. Examines a selection of recent research illustrating a variety of productive and innovative approaches to problems in historical linguistics. Readings center on phonological and morphological evolution in the Romance and Germanic families. Students carry out guided research projects.

LING 421-422 Semantics I, II
421, fall; 422, spring. 4 credits each term. Prerequisites: for Linguistics 421, Linguistics 203; for Linguistics 422, Linguistics 421 or permission of instructor. Staff. 421: An introduction to semantics of natural language. The course starts from basic foundational questions concerning the nature of meaning and the empirical domain of semantic theory. Truth-conditional and logical theories and then moves to the investigation of the structure of natural languages are extensively explored (with some comparisons with other approaches). Through the study of quantification, scope, anaphora, modalities, presuppositions, and the like, one tries to gain insight into general characteristics of the cognitive apparatus that is at the basis of our capacity for understanding sentences. 422: guides students into current work in semantic theory. The first half of the course is an introduction to Montague-style semantics, whose influence on current research is quite extensive. The second half of the course focuses on selected topics that have grown out of (and sometimes against) classical Montague semantics. Such topics are usually drawn from the following: quantifiers and anaphora, problems of tense and aspect, the linguistic relevance of algebraic approaches to properties, propositions, events and thematic roles, and discourse representation theory.

LING 430 Structure of Korean
Spring. 4 credits. Offered alternate years. Not offered 1995–96. J. Whitney. Intensive examination of the syntax and phonology of a non-Indo-European language with the objective of testing principles of current linguistic theory. No previous knowledge of Korean required.

LING 431 Structure of an African Language
Spring. 4 credits. Prerequisite: Linguistics 101 or permission of the instructor. Offered alternate years. V. Carstens. A survey of the grammar of an African language in light of current linguistic theory.

LING 436 Language Development (also Psychology 436 and Human Development and Family Studies 436)
Spring. 4 credits. Prerequisite: at least one course in developmental psychology, cognitive psychology, cognitive development, or linguistics. Offered alternate years. B. Lust. A survey of basic issues, methods, and research in study of first-language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition. Issues of phonology, syntax, and semantics from infancy on. The fundamental linguistic issues of universal grammar and the biological foundations for acquisition are discussed, as are the issues of relations between language and thought. The acquisition of communication systems in nonhuman species such as chimpanzees are addressed, but major emphasis is on the child.

LING 440 Dravidian Structures
Spring, according to demand. 4 credits. Prerequisite: Linguistics 101. J. Gair. A comprehensive and comparative analysis of the structures of several Dravidian languages.

LING 442 Indo-Aryan Structures
Fall, according to demand. 4 credits. Prerequisite: Linguistics 101. Not offered 1995–96. J. Gair. Typological discussion of the languages of the subfamily. Specific topics and emphasis may vary depending on the interest of the students.

LING 443-444 Linguistic Structure of Russian (also Russian 403-404)
443, fall; 444, spring. 4 credits each term. Prerequisites for Linguistics 443, permission of instructor and Linguistics 101; for Linguistics 444, Linguistics 443 or equivalent. Offered alternate years. Not offered 1995–96. W. Browne. A synchronic analysis of the structure of modern Russian. Linguistics 443 deals primarily with morphology and its relation to syntax and 444 with syntax and word order. Topics covered include case theory, the functions of word order, voice, agreement, impersonal constructions, negation, nonuniversal categories, and the relation between morphology and syntax.

MODERN LANGUAGES AND LINGUISTICS 429
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Offered Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>LING 450</td>
<td>Mathematical Methods for Linguists</td>
<td>4</td>
<td>Linguistics 203</td>
<td>Fall, Spring</td>
</tr>
<tr>
<td>LING 493</td>
<td>Honors Thesis Research</td>
<td>4</td>
<td>May be taken before or after Linguistics 494, or</td>
<td>May be taken independently</td>
</tr>
<tr>
<td>LING 494</td>
<td>Honors Thesis Research</td>
<td>4</td>
<td>Staff</td>
<td></td>
</tr>
<tr>
<td>LING 514</td>
<td>Syntax of African Languages</td>
<td>4</td>
<td>Linguistics 101 and permission of instructor. Not</td>
<td>Fall, Spring, Summer, Fall</td>
</tr>
<tr>
<td>LING 600</td>
<td>Field Methods</td>
<td>4</td>
<td>Prerequisites: Linguistics 201 and 203 or permission of instructor. Not offered 1995-96. V. Cantens.</td>
<td>Winter, Fall, Spring</td>
</tr>
<tr>
<td>LING 601</td>
<td>Topics in Phonological Theory</td>
<td>4</td>
<td>Prerequisites: Linguistics 301 and one higher-level course in phonology. A. Cohn.</td>
<td>Winter, Spring</td>
</tr>
<tr>
<td>LING 603</td>
<td>History of Linguistics</td>
<td>4</td>
<td>Prerequisites: Linguistics 300 or permission of instructor.</td>
<td>Winter, Fall</td>
</tr>
<tr>
<td>LING 604</td>
<td>Research Workshop</td>
<td>4</td>
<td>Prerequisites: Linguistics 4. S-U grade only. Prerequisites: at least one course in linguistics or permission of instructor. Offered alternate years.</td>
<td>Winter, Fall</td>
</tr>
<tr>
<td>LING 607</td>
<td>Twentieth-Century Linguistics</td>
<td>4</td>
<td>Prerequisite: at least one course in linguistics or permission of instructor. Offered alternate years.</td>
<td>Winter, Fall</td>
</tr>
<tr>
<td>LING 608</td>
<td>Discourse Analysis</td>
<td>4</td>
<td>Prerequisite: permission of instructor.</td>
<td>Winter, Fall</td>
</tr>
<tr>
<td>LING 609</td>
<td>Greek Comparative Grammar (also Classics 421)</td>
<td>4</td>
<td>Prerequisites: thorough familiarity with the morphology of classical Greek. Not offered 1995-96. Next offered 1997-98. A. Nussbaum.</td>
<td>Winter, Spring</td>
</tr>
<tr>
<td>LING 611</td>
<td>Greek Dialects (also Classics 425)</td>
<td>4</td>
<td>Prerequisites: ability to read Homeric Greek. A. Nussbaum.</td>
<td>Winter, Spring</td>
</tr>
<tr>
<td>LING 615</td>
<td>Mycenaean Greek (also Classics 429)</td>
<td>4</td>
<td>Prerequisites: thorough familiarity with the morphology of classical Greek. A. Nussbaum.</td>
<td>Winter, Spring</td>
</tr>
<tr>
<td>LING 616</td>
<td>Syntax III</td>
<td>4</td>
<td>Prerequisites: Linguistics 304 or permission of instructor.</td>
<td>Winter, Spring</td>
</tr>
<tr>
<td>LING 617-618</td>
<td>Hittite</td>
<td>4</td>
<td>Prerequisites: for Linguistics 617, permission of instructor; for Linguistics 618, Linguistics 617 or permission of instructor. Not offered 1995-96.</td>
<td>Winter, Spring</td>
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</tbody>
</table>

The prehistory and evolution of the sounds and forms of ancient Greek as reconstructed by comparison with the other Indo-European languages.

| LING 620   | Area Topics in Romance Linguistics (also FRLIT 620)  | 4       | Prerequisite: a reading knowledge of French. Not offered 1995-96. A. Colby-Hall. | Winter, Spring                     |
| LING 621   | Problems and Methods in Romance Linguistics          | 4       | Prerequisite: Linguistics 101 or equivalent and qualification in two Romance languages. Offered alternate years. | Winter, Spring                     |
| LING 623-624| Old Irish                                            | 4       | Prerequisites: for 623: 623 or permission of instructor. Not offered 1995-96. | Winter, Spring                     |
| LING 625-626| Middle Welsh                                         | 4       | Prerequisites: Linguistics 436 or equivalent or permission of instructor. | Winter, Spring                     |
| LING 631   | Comparative Indo-European Linguistics                | 4       | Prerequisite: permission of instructor. | Winter, Spring                     |
| LING 632   | Indo-European Workshop                               | 4       | Prerequisite: Linguistics 436 or equivalent or permission of instructor. | Winter, Spring                     |
| LING 633   | Seminar in First-Language Acquisition:               | 4       | Prerequisite: permission of instructor. | Winter, Spring                     |
| LING 635-636| Indo-European Workshop                               | 4       | Prerequisite: permission of instructor. | Winter, Spring                     |
| LING 637   | Experimental Research for Language Sciences          | 4       | Prerequisite: permission of instructor. | Winter, Spring                     |

A detailed study of experimental procedures for carrying out research in linguistics, especially in the areas of Applied Linguistics, Phonetics and Language Acquisition. Quantitative and qualitative research methods are considered.

A detailed study of experimental procedures for carrying out research in linguistics, especially in the areas of Applied Linguistics, Phonetics and Language Acquisition. Quantitative and qualitative research methods are considered.
LING 648 Speech Synthesis by Rule
Spring. 4 credits. Prerequisite: Linguistics 301, 319, or permission of instructor. Offered alternate years.
Investigates the nature of the acoustic structure of speech synthesis, using speech as a tool for exploring this structure. A particular acoustic model will be proposed, developed, and motivated by considering the relationship between phonological and acoustic structure, speech timing, phonetic universals, coarticulation, and speech perception. The primary tool for investigation will be the Delta System, a powerful software system for investigating phonology and phonetics through speech synthesis. The course is meant for graduate students and advanced undergraduate students in linguistics, but may also be of interest to students in psychology/psycholinguistics, computer science, and cognitive studies.

LING 653-654 Seminar in Southeast Asian Linguistics
653, fall; 654, spring. 4 credits each term. Prerequisite: Linguistics 303 or permission of instructor. Linguistics 653 is not a prerequisite for 654. Not offered 1995-96. G. Diffloth.
Languages of mainland Southeast Asia. Topics, chosen according to student interests, may include description, dialectology, typology, comparative reconstruction, and historical studies.

LING 655-656 Seminar in Austronesian Linguistics
655, fall; 656, spring. 4 credits each term. Prerequisites: for Linguistics 655, Linguistics 101 and permission of instructor; for Linguistics 656, Linguistics 655. Not offered 1995-96. J. Wolff.
Descriptive and comparative studies of Malayo-Polynesian languages.

LING 657-658 Seminar in Austrasiatic Linguistics
[657, fall;] 658, spring. 4 credits each term. Prerequisites: Linguistics 101 or permission of instructor. Not offered 1995-96. G. Diffloth.
Descriptive and comparative studies of Austrasiatic languages.

LING 700 Seminar
Fall or spring, according to demand. Credit to be arranged.
Seminars are offered according to faculty interest and student demand. Topics in recent years have included subject and topic, Montague grammar, speech synthesis, lexicography, classical and autonomous phonology, Japanese sociolinguistics, relational grammar, semantics and semiotics, and others.

LING 701-702 Directed Research
701, fall; 702, spring. 1-4 credits. Hours to be arranged. Staff.

LING 773-774 Prosseminar in Cognitive Studies II
Fall. R. Grade; spring: S-U only. 4 credits. Staff.
This year-long seminar is intended to provide graduate students with an interdisciplinary introduction to the study of knowledge, its representation, acquisition, and use.

Additional Linguistics Courses
French 232 The French Language Today
[French 401 History of the French Language]
French 405 Contemporary Theories of French Grammar
[French 407 Applied Linguistics: French]
[French 408 Linguistic Structure of French]
[French 410 Semantic Structure of French]
French 700 Seminar in French Linguistics
[German 401 Introduction to Germanic Linguistics]
[German 402 History of the German Language]
German 404 Modern German Syntax
German 407 Teaching German as a Foreign Language
German 602 Gothic
[German 603 Old High German, Old Saxon]
German 605 Structure of Old English
German 606 Topics in Historical Germanic Phonology
[German 607 Topics in Historical Germanic Morphology]
[German 608 Topics in Historical Germanic Syntax]
German 609-610 Old Norse
[German 611 Readings in Old High German and Old Saxon]
[German 710 Seminar in Germanic Linguistics]
[German 720 Seminar in Comparative Germanic Languages]
[German 730 Seminar in Germanic Linguistics]
[Hindi 700 Seminar in Hindi Linguistics]
[Indonesian 300 Linguistic Structure of Indonesian]
[Italian 403 Linguistic Structure of Italian]
[Italian 404 History of the Italian Language]
[Italian 631 Readings in Italian Opera Libretti]
Japanese 404 Linguistic Structure of Japanese
Japanese 410 History of Japanese Language
[Khmer 403-404 Structure of Khmer]
[Russian 207-208 Russian Phonetics for Beginners]
[Russian 301-302 Advanced Russian Grammar and Reading]
[Russian 401-402 History of the Russian Language]
[Russian 403-404 Linguistic Structure of Russian]
[Russian 407-408 Russian Phonetics]
[Russian 409 Teaching Russian as a Foreign Language]
Russian 601 Old Church Slavic
Russian 602 Old Russian
[Russian 651-652 Comparative Slavic Linguistics]
[Russian 700 Seminar in Slavic Linguistics]
[Spanish 401 History of the Spanish Language]
[Spanish 407 Applied Linguistics: Spanish]
[Spanish 408 The Grammatical Structure of Spanish]
[Spanish 601 Hispanic Dialectology]
[Spanish 700 Seminar in Spanish Linguistics]
[Taqalog 300 Linguistic Structure of Tagalog]
[Welsh 404-405 The Structure of Welsh I & II]
[Welsh 411 Readings of Modern Welsh]

MANDINKA
Fees. A small fee may be charged for photocopied texts for course work.

[MANDI 121-122 Elementary Mandinka (also Africana Studies and Research Center)]
121, fall; 122, spring. 4 credits each term. Prerequisite: for Mandinka 122, 121 or examination. Not offered 1995-96.
Foundations provided in all basic language skills, with an emphasis on speech and aural comprehension. Classes provide speaking and listening practice.

[MANDI 123 Continuing Mandinka (also Africana Studies and Research Center)]
Fall. 4 credits. Prerequisite: Mandinka 122 or equivalent. Not offered 1995-96.
Building on 121-122, this is an all-skills course with a functional emphasis. Class will be conversational.

[MANDI 203 Intermediate Mandinka (also Africana Studies and Research Center)]
Spring. 3 credits. Prerequisite: Mandinka 123 or equivalent. Not offered 1995-96.

Nepali
Study Abroad in Nepal
Cornell and the central campus of the Nepalese national university—Tribhuvan—at Kathmandu, co-sponsor an academic year in Nepal. North American students study and live with Nepalese students who come from outside the Kathmandu Valley to Tribhuvan University. Students may participate in one or two semesters. Courses are offered both at Tribhuvan University and at the Cornell-Nepal Study Program House adjacent to the university. All courses are officially taught in English. A five-week, inter-country orientation program includes classes in intensive Nepali conversation, cultural orientation programs, and a ten-day field trip and trek. Semester course offerings include Nepali language (Tibetan and/or Newari languages also possible), contemporary issues in Nepalese studies, field research design and methods, and guided field research.

Juniors and seniors in good academic standing from any major field may participate. Students must have a desire to study on the other side of the world, to participate in a multicultural program, and to undertake rigorous field research. No experience in Nepal is necessary and instruction is in English, but some prior Nepali language study is strongly recommended. Students interested in the study abroad in Nepal program should consult with the Cornell Abroad office (474 Uris) for further information.

Fees. A small fee may be charged for photocopied texts for course work.

NEPAL 101-102 Elementary Nepali
101, fall; 102, spring. 6 credits each term. Prerequisite: for Nepali 102, 101 or examination. S. Oja.
Enrollment is by permission only. The emphasis is on basic grammar, speaking and comprehension skills, utilizing culturally appropriate materials and texts. Devanagari script for reading and writing is also introduced.

NEPAL 160 Intensive Nepali
Summer only. 10 credits. Intended for beginners. Offered alternate years. Offered 1997. S. Oja.
Emphasis will be on the spoken language, in dialogues, exercises, and conversation practice. In addition, however, special attention is given to assisting students to develop vocabularies and abilities appropriate to their unique professional needs. Reading and writing practice use both colloquial and scholarly materials in the Nepali (Devanagari) script.

NEPAL 204 Intermediate Nepali
Fall. 4 credits. Prerequisite: Nepali 101-102. Not offered 1994-95.
Building on 101-102, this is an all-skills course with an emphasis on functional and professional language skills in spoken and written Nepali. Class will be conversational.
### NEPAL 201-202 Intermediate Nepali

**Conversation @**

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

**Fees.** A small fee may be charged for photocopied texts for course work.

**Prerequisites:** Nepali 201 or examination.

**S. Oja.**

Intermediate instruction in spoken grammar and oral comprehension, with special attention to the technical vocabularies, necessary writing skills, and published materials typical of advanced students' professional fields.

### NEPAL 203-204 Intermediate Nepali

**Composition @**

- 203, fall or summer; 204, spring. 3 credits each term. Prerequisites: for Nepali 203, Nepali 102 or examination; for Nepali 204, Nepali 203 or examination. S. Oja.
- A systematic review of written grammar and reading comprehension, with special attention to the technical vocabularies, necessary writing skills, and published materials typical of advanced students' professional fields.

### NEPAL 301-302 Advanced Nepali

- 301, fall or summer; 302, spring. 3 credits each term. Prerequisites: Nepali 204 or permission of instructor. S. Oja.
- Reading of advanced texts, together with advanced drill on the spoken language.

### Pall

**Fees.** A small fee may be charged for photocopied texts for course work.

### PALI 131-132 Elementary Pali

- 131, fall or spring. 3 credits each term. Prerequisites: for Pali 131, Pali 102 or examination; for Pali 132, Pali 131 or examination. J. Gair.
- **131 is an introduction to the language of the canonical texts of Theravada Buddhism.**
- Reading of authentic texts of Theravada Buddhism. Emphasis on both text and grammatical structure. Familiarity with Sanskrit is not required. 132 is a continuation of 131 with further readings.

### Polish

**Fees.** A small fee may be charged for photocopied texts for course work.

**POLISH 131-132 Elementary Polish**

- 131, fall or spring. 3 credits each term. Prerequisite for Polish 132: Polish 131 or equivalent. Offered alternate years. Not offered 1995-96. W. Browne.
- Covers all language skills: speaking, listening, comprehension, reading, and writing.

**POLISH 133-134 Continuing Polish**

- 133, fall or spring. 3 credits each term. Prerequisites: for Polish 133, Polish 132 or equivalent; for Polish 134, Polish 133 or equivalent. Offered alternate years. W. Browne.
- An intermediate conversation and reading course.

### Portuguese

**Fees.** A small fee may be charged for photocopied texts for course work.

**PORT 121-122 Elementary Portuguese**

- 121, fall or spring. 4 credits each term. Intended for beginners. Students may attain qualification upon completion of 122 by achieving a satisfactory score on a special examination. J. Oliviera.
- A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

**PORT 203-204 Intermediate Composition and Conversation @**

- 203, fall or spring. 3 credits each term. Prerequisites: for Portuguese 204, Portuguese 122 or permission of instructor; for Portuguese 204, Portuguese 203 or permission of instructor. J. Oliviera.
- **PORT 303-304 Advanced Composition and Conversation @**

- 303, fall or spring. 4 credits each term. Prerequisites: for Portuguese 303, Portuguese 204 or equivalent; for Portuguese 304, Portuguese 303 or equivalent. J. Oliviera.

### Quechua

**Fees.** A small fee may be charged for photocopied texts for course work.

**QUECH 131-132 Elementary Quechua**

- 131, fall; 132, spring. 3 credits each term. Prerequisite: qualification in Spanish. L. Morato Peña.
- A beginning conversation course in the Cuzco dialect of Quechua.

**QUECH 133-134 Continuing Quechua**

- 133, fall; 134, spring. 3 credits each term. Prerequisites: for Quechua 133, Quechua 131-132 or equivalent; for Quechua 134, Quechua 133 or equivalent. L. Morato Peña.
- An intermediate conversation and reading course. Study of the Huarochni manuscript.

**[QUECH 135-136 Quechua Writing Lab @]**

- 135, fall; 136, spring. 1 credit each term. Prerequisites: concurrent enrollment in Quechua 131-132 or instructor's approval. Letter grade only. L. Morato Peña.
- Computer-assisted drill and writing instruction in elementary Quechua.

### Romance Linguistics

**[LING 321-322 History of the Romance Languages @]**

- 321, fall; 322, spring. 4 credits. Prerequisite for 321: Linguistics 101 or equivalent, and qualification in any Romance language. Offered alternate years. Not offered 1995-96.
- **For description see Linguistics 321-322.**

**[LING 323-324 Comparative Romance Syntax @]**

- 323, Fall; 324, Spring. 4 credits. Prerequisites: Linguistics 101 or equivalent and qualification in any Romance language. Offered alternate years. Not offered 1995-96.
- **For description see Linguistics 323-324.**

**[LING 620 Area Topics in Romance Linguistics @]**

- Spring. 4 credits. May be repeated for credit. Offered alternate years. Not offered 1995-96.

**[LING 621 Problems and Methods in Romance Linguistics @]**

- Fall. 4 credits. Prerequisites: Linguistics 101 or equivalent and qualification in two Romance languages. Offered alternate years. Not offered 1995-96.

###-Russian

** RUSSA 103-104 Conversation Practice **

- 103, fall; 104, spring. 2 credits each term. Must enroll in one section of 103 and one section of 104 in the fall; and one section of 104 and one section of 122 in the spring. L. Paperno, V. Tsimberov.

** RUSSA 121-122 Elementary Russian **

- 121, fall or summer; 122, spring or summer. 4 credits each term. May be taken alone and qualification will be achieved with satisfactory completion of 121-122; or may be taken concurrently with 103-104 and qualification will be achieved at completion of 122-104. L. Paperno, V. Tsimberov.

A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.
This course is intended primarily to increase the student's active command of difficult Russian syntactic constructions. Special attention is paid to word order, impersonal constructions, negation, participles, and verb forms. Russian texts. Grammatical analysis and close reading of Old Russian texts.

RUSSA 300-301 Advanced Individual Study 300, fall, 301, spring. 2 credits each term. Prerequisite: placement by the department. Staff.

This course is intended for students with special needs that cannot be met by any other Russian course.

RUSSA 309-310 Advanced Reading 309, fall, 310, spring. 4 credits each term. Prerequisites: for Russian 309, Russian 204; for Russian 310, Russian 309 or equivalent. L. Paperno. The purpose of the course is to teach reading skills. The weekly reading assignment is 20–40 pages of unabridged Russian prose (non-fiction) of the 20th century. The discussion of the reading is conducted entirely in Russian and is centered around the content of the assigned selection.

RUSSA 403-404 Linguistic Structure of Russian 403, fall, 404, spring. 4 credits each term. Prerequisites: for Russian 403, permission of instructor; for Russian 404, Russian 401 or equivalent. Offered alternate years. Not offered 1995–96. W. Browne. A synchronic analysis of the structure of modern Russian. Russian 403 deals primarily with morphology and its relation to syntax and 404 with syntax and word order. Topics covered include case theory, the functions of word order, voice, agreement, impersonal constructions, negation, nonuniversal categories, and the relation between morphology and syntax.

RUSSA 407-408 Russian Phonetics 407, fall, 408, spring. 4 credits each term. Prerequisite: Russian 204. Not offered 1995–96. W. Browne. Treats both the practical and theoretical aspects of Russian phonetics. Lab work includes the use of the computer for acoustic phonetics, primarily for undergraduate majors in Russian and for graduate students in Slavic linguistics and Russian literature.

RUSSA 409 Teaching Russian as a Foreign Language Fall or spring. 3 credits. Prerequisite: very good command of Russian. L. Paperno. Designed to equip the teacher of Russian with the basic skills of conducting a class. Geared to the courses and methodology used in the Russian language program at Cornell. Not a theoretical course.

RUSSA 413-414 Advanced Conversation and Stylistics 413, fall, 414, spring. 2 credits each term. Prerequisites: for Russian 413, Russian 303–304 or the equivalent, for Russian 414, Russian 413 or equivalent. L. Paperno or S. Paperno, V. Tsimberov. Discussion of authentic unabridged Russian texts and films (feature and documentary) in a variety of nonliterary styles and genres.

RUSSA 601 Old Church Slavic Fall. 4 credits. This course is prerequisite to Russian 602. Offered alternate years. W. Browne. Grammar and reading of basic texts.

RUSSA 602 Old Russian Texts Spring. 4 credits. Prerequisite: Russian 601. Offered alternate years. W. Browne. Grammatical analysis and close reading of Old Russian texts.

RUSSA 633-634 Russian for Russian Specialists 633, fall, 634, spring. 2 credits each term. Prerequisite: four years of college Russian. For graduate and advanced undergraduate students. L. Paperno, S. Paperno. The course is designed for students who specialize in an area of Russian studies requiring fine active control of the language. Fine points of syntax, usage, and style are discussed.

RUSSA 700 Seminar in Slavic Linguistics Offered according to demand. Variable credit. Not offered 1995–96. Staff. Topics chosen according to the interests of staff and students.
Covers all language skills: speaking, listening, comprehension, reading, and writing.

**[SEBCR 133-134 Continuing Serbo-Croatian]**
133, fall; 134, spring. 3 credits each term. Prerequisite: Serbo-Croatian 133, Serbo-Croatian 132 or equivalent; for Serbo-Croatian 134, Serbo-Croatian 133 or equivalent. Offered alternate years. Not offered 1995-96. W. Browne.

An intermediate conversation and reading course.

**Sinhalae (Sinhalese)**
Fees. A small fee may be charged for photocopied texts for course work.

**SINHA 101-102 Elementary Sinhala**
101, fall; 102, spring. 6 credits each term. Prerequisite for Sinhala 102: Sinhala 101 or equivalent. M. Rodrigo.

A semi-intensive course for beginners. A thorough grounding is given in all the language skills; listening, speaking, reading, and writing.

**SINHA 160 Intensive Sinhala**
Summer only. 10 credits. Intended for beginners. Offered alternate years. Offered 1996.

Emphasis is on the spoken (colloquial) language, the writing system is introduced and used to present all Sinhala materials, with additional reading practice with colloquial materials. A foundation is laid for later study of the written language (literary Sinhala).

**SINHA 201-202 Intermediate Sinhala Reading**
201, fall; 202, spring. 3 credits each term. Prerequisites: for Sinhala 201, Sinhala 102; for Sinhala 202, Sinhala 201 or equivalent. M. Rodrigo.

**SINHA 203-204 Intermediate Composition and Conversation**
203, fall; 204, spring. 3 credits each term. Prerequisites: for Sinhala 203, Sinhala 102 or permission of instructor; for Sinhala 204, Sinhala 203 or equivalent. M. Rodrigo.

**Related Courses**
See also Linguistics 442, 651.

**Spanish**
M. Suiter, (director of undergraduate studies, 218 Morrill Hall, 255-0714).

For advanced Spanish language and literature courses see Romance Studies.

**The Major**
The major is designed to give students proficiency in the oral and written language, to acquaint them with Hispanic culture, and to develop their skill in the linguistic analysis of Spanish. (For the major in Spanish literature see the description under Romance Studies.) Satisfactory completion of the major should enable students to meet language requirements for teaching, to continue with graduate work in Spanish or other appropriate disciplines, or to satisfy standards for acceptance into the training programs of the government, social agencies, and business concerns. A Spanish major combined with another discipline may also allow a student to undertake pre-professional training for graduate study in law, medicine, business, etc. Students interested in a Spanish major are encouraged to seek faculty advice as early as possible. For acceptance into the major, students should consult the director of undergraduate study in the Department of Modern Languages and Linguistics, Professor Suiter (218 Morrill Hall), who will admit them to the major.

**The Core**
All majors will work out a plan of study in consultation with their advisers. Previous training and interests as well as vocational goals are taken into account when the student's program of courses is determined. Spanish 201 and 204 or 212 (or equivalent) are prerequisite to entering the major in Spanish. All majors normally include the following core courses in their programs:
1) Spanish 315-316-317 or 318
2) Spanish 311 and 312 (or equivalent)

Spanish majors have great flexibility in devising their programs of study and areas of concentration.

**The Linguistic Option**
Spanish linguistics, for which the program normally includes at least 20 credits, and at least 8 additional credits in general or Spanish linguistics (such as 366, 401, 405, 407, 408 and others). (Linguistics 101 is recommended before entering this program.) The J. G. White Prize and Scholarships are available annually to students who achieve excellence in Spanish.

**Study Abroad in Spain**
Cornell, the University of Michigan and the University of Pennsylvania cosponsor an academic year in Spain program. Students enrolled in this program spend the first four weeks before the fall semester begins in a residential college located on the campus of the University of Madrid, where they take a course in Spanish language and contemporary society and take advantage of special lectures and field trips to Madrid and Castile. This course carries three credits. In early October the program moves to Seville, where students enroll in as many regular classes at the University of Seville as their language competency and general education permit. Their academic work is supplemented by courses designed explicitly for the program by Seville faculty, as well as a seminar regularly offered by the resident director, who is chosen from the faculty of either Cornell, Michigan or Pennsylvania. The special courses normally include history of art and architecture, Spanish composition and syntax, and modern Spanish history. In Seville students live with selected families. Cornell-Michigan-Pennsylvania also maintains a center in Seville, which is used by students for special seminars, tutorials, lectures, and informal gatherings.

Applicants are expected to have at least completed Spanish 204 prior to departure. Students are strongly encouraged to study abroad for the entire year rather than for one semester. Students interested in the study abroad program should consult with the Cornell Abroad office for further information (474 Uris Hall, 255-6224).

**Honors**
Honors in Spanish may be achieved by superior students who want to undertake guided independent reading and research in an area of their choice. Students in the senior year select a member of the Spanish faculty from either the Department of Romance Studies or the Department of Modern Languages and Linguistics to supervise their work and direct the writing of their honors essays (see Spanish 429-430).

**Fees**
Depending on the course, a small fee may be charged for photocopied texts for course work.

**Important information about registration for Spanish classes**
The Spanish Program offers a number of elementary and intermediate courses to satisfy the needs of students with a variety of backgrounds; students are urged to register for the appropriate level so as to start the semester in the right class. **Students with 2 or more years in the language are required to take the placement test before taking any Spanish course unless they already have a score from their achievement test.**

**Background**
0 Spanish
less than 2 years
2 years or more
2) Spanish course
Placement Score*
less than 370
Spanish 121
370-440
Spanish 121
450-550
Spanish 123
560 or more
Spanish 200, 203, 213

*the placement score can be from an achievement test, the CPT, or the SPT.

**SPAN 101 Basic Course I**
Summer only. 6 credits. Prerequisite: no Spanish.

This course is intended for students with absolutely no experience in Spanish. (Spanish 125 and 203 are usually offered in the summer concurrently with 101 for students with prior experience.) Spanish 101 provides a thorough grounding in all language skills. Language practice in small groups. Lectures cover grammar, reading, and cultural information.

**SPAN 112 Elementary Spanish: Review and Continuation**
Fall. 4 credits. Prerequisite: placement score of 370-440. M. Rice.

This course is designed for students who have taken some Spanish, and who have a placement score of 370-440. It provides a basic review and then moves on to cover new material for the remainder of the term. Students who have taken Spanish 121 may enroll for this course. The final exam, students take the SPT and, according to their score, may place into Spanish 123 (score below 500) or receive qualification (560 or above), and placement into the 200-level courses. Evening prelim.
SPAND 123 Continuing Spanish
Fall, spring, or summer. 4 credits.
Prerequisite: Spanish 112, Spanish 122, or a placement score of 450-550.
An all-skills course designed to prepare students for study at the 200-level. Satisfactory completion of Spanish 123 fulfills the qualification portion of the language requirement. Evening prelin.

SPAND 200 Spanish for English/Spanish Bilinguals
Spring. 3 credits. Prerequisites: Placement score of 560-640, case placement, or permission of the instructor.
D. Cruz de Jesús.
A course designed to expand bilingual students' knowledge of Spanish by providing them with ample opportunities to develop and improve each of the basic language skills.

SPAND 203 Intermediate Composition and Conversation
Fall, spring, or summer. 3 credits.
Prerequisite: qualification in Spanish (Spanish 123 or CPT or SPT score 560-640). Not available to students who have taken Spanish 213. D. Cruz de Jesús.
Conversational grammar review with special attention to the development of accurate and idiomatic oral expression. Includes readings in contemporary Spanish prose and practice in writing.

SPAND 204 Intermediate Composition and Conversation
Fall or spring. 3 credits. Prerequisite: Spanish 203 or permission of instructor.
E. Dozier.
Practice in conversation with emphasis on improving oral and written command of Spanish. Includes treatment of specific problems in grammar, expository writing, and readings in contemporary prose.

SPAND 213 Intermediate Spanish for the Medical and Health Professions
Fall or spring. 3 credits. Prerequisite: qualification in Spanish (Spanish 123 or CPT or SPT score 560-640), or permission of instructor.
D. Cruz de Jesús.
Conversational grammar review, with dialogues, debates, compositions and readings on health-related themes. Special attention is given to relevant cultural differences. Fulfills proficiency requirement.

SPAND 310 Advanced Conversation and Pronunciation
Spring. 2 credits. Prerequisite: Spanish 204 or equivalent. Z. Iguina.
A conversational course with intensive oral practice obtained through the production of video programs. Study of the fundamental aspects of communication in the standard spoken and written Spanish, with some focus on dialectal variations. Weekly phonetics labs to improve pronunciation.

SPAND 366 Spanish in the United States (also Linguistics 366)
Fall. 4 credits. Prerequisite: some knowledge of Spanish. Counts toward the social science distribution requirement.
J. Wolff.
Examination of major Spanish dialects in the United States from a linguistic perspective. Contrast with the standard language.

SPAND 401 History of the Spanish Language
Fall. 4 credits. Prerequisites: Linguistics 101 and qualification in Spanish, or permission of the instructor. Not offered 1995-96.
A historical analysis of the phonology, morphology, syntax, and lexicon of the Spanish language up to the seventeenth century. Selected medieval documents are read and discussed.

SPAND 407 Applied Linguistics: Spanish
Fall. 4 credits. Prerequisite: proficiency in Spanish or permission of instructor.
M. Suñer.
Designed to equip the student or future teacher of Spanish with insights into problem areas for second-language learners by using linguistic descriptions.

SPAND 408 The Grammatical Structure of Spanish
Spring. 4 credits. Prerequisites: proficiency in Spanish and Linguistics 101 or permission of instructor. Offered alternate years.
M. Suñer.
Survey of the salient morphological and syntactic characteristics of contemporary Spanish.

SPAND 601 Hispanic Dialectology
Spring. 4 credits. Not offered 1995-96. Survey of dialects of Latin America and the Caribbean.

SPAND 700 Seminar in Spanish Linguistics
Fall or spring, according to demand.
Topics in synchronic and diachronic Spanish linguistics.

Swahili
See listings under Africana Studies and Research Center.

Swedish
Fees. A small fee may be charged for photocopied texts for course work.

SWED 121-122 Elementary Swedish
121, fall; 122, spring. 4 credits each term.
Prerequisite for 122: Swedish 121 or equivalent. L. Tranck.
The aim of this course is to develop skills in listening, speaking, reading and writing within Sweden's cultural context.

SWED 123 Continuing Swedish
Fall. 4 credits. Prerequisite: Swedish 122 or equivalent. L. Tranck.
Continues developing skills in spoken and written Swedish within Sweden's cultural context.

SWED 203 Intermediate Swedish
Spring. 3 credits. Prerequisite: Swedish 123 or permission of instructor. L. Tranck.
Emphasis on development of all skills, through writing, reading, and discussion of culturally significant texts. Audiovisual material will further enhance language comprehension.

SWED 204 Advanced Swedish
Fall. 3 credits. Prerequisite: Swedish 203 or permission of instructor. Taught in Swedish.
L. Tranck.
THAI 101–102 Elementary Thai
101, fall; 102, spring. 6 credits each term. Prerequisite for Thai 102, Thai 101 or equivalent. Intended for beginners or students placed by examination. N. Jagacinski.
A thorough grounding is given in all the language skills: listening, speaking, reading, and writing.

THAI 201–202 Intermediate Thai Reading
201, fall; 202, spring. 3 credits each term. Prerequisites: for Thai 201, Thai 102; for Thai 202, Thai 201 or equivalent. N. Jagacinski.

THAI 203–204 Intermediate Composition and Conversation @
203, fall; 204, spring. 3 credits each term. Prerequisites: for Thai 203, Thai 102; for Thai 204, Thai 203. N. Jagacinski.
Selected readings in Thai writings in various fields.

THAI 301–302 Advanced Thai @
301, fall; 302, spring. 4 credits each term. Prerequisite: Thai 202 or equivalent. N. Jagacinski.
Reading of significant novels, short stories, and poetry written since 1850.

THAI 401–402 Directed Individual Study
401, fall; 402, spring. 4 credits each term. For advanced students or students with special problems or interests. Prerequisite: permission of instructor. N. Jagacinski.

Ukrainian

 Fees. A small fee may be charged for photocopied texts for course work.

UKRAN 131–132 Elementary Ukrainian
131, fall; 132, spring. 3 credits each term. Prerequisite for Ukrainian 132, Ukrainian 131 or equivalent. Not offered 1995–96. Covers all language skills: speaking, listening, comprehension, reading, and writing.

Urdu

See listing under Hindi.

Vietnamese

 Fees. A small fee may be charged for photocopied texts for course work.

VIET 103–104 Vietnamese Conversation Practice
103, fall; 104, spring. 2 credits each term. Prerequisite for Vietnamese 104, Vietnamese 103 and Vietnamese 121. May not be taken alone. Must be taken simultaneously with Vietnamese 121–122. Satisfactory completion of Vietnamese 104/122 fulfills the qualification portion of the language requirement. D. Nghieu.
Additional drills, practice and extension of materials covered in Vietnamese 121 and 122. These courses are designed to be attended simultaneously with Vietnamese 121–122 respectively, allowing students to obtain qualification within a year.

VIET 121–122 Elementary Vietnamese
121, fall; 122, spring. 4 credits each term. Prerequisite for Vietnamese 122, Vietnamese 121. May be taken alone or simultaneously with Vietnamese 103–104. Satisfactory completion of Vietnamese 104/122 fulfills the qualification portion of the language requirement. D. Nghieu.
A thorough grounding is given in all language skills: listening, speaking, reading, and writing.

VIET 123 Continuing Vietnamese
Fall. 4 credits. Prerequisite: Vietnamese 122. Satisfactory completion of Vietnamese 123 fulfills the qualification portion of the language requirement. D. Nghieu.
Continuing instruction in conversational and reading skills, to prepare students for 200-level courses.

VIET 201–202 Intermediate Vietnamese Reading
201, fall or spring; 202, fall or spring. 3 credits each term. Prerequisites: for Vietnamese 201, Vietnamese 123; for Vietnamese 202, Vietnamese 201. D. Nghieu.
Continuing instruction in spoken and written Vietnamese.

VIET 301–302 Advanced Vietnamese
301, fall or spring; 302, fall or spring. 3 credits each term. Prerequisite for Vietnamese 301, Vietnamese 202 or permission of instructor; for Vietnamese 302, Vietnamese 301. D. Nghieu.
Continuing instruction in spoken and written Vietnamese; emphasis on enlarging vocabulary, increasing reading speed, and reading various genres and styles of prose.

VIET 401–402 Directed Individual Study
401, fall; 402, spring. 2–4 credits variable each term. Prerequisite: permission of instructor. Intended for advanced students. D. Nghieu.
Various topics according to need.

Welsh

 Fees. A small fee may be charged for photocopied texts for course work.

[WELSH 404–405 The Structure of the Welsh I & II]
404, Fall; 405, Spring. 4 credits each term. Prerequisite: Linguistics 101. Not offered 1995–96. W. Harbert.
404: Structure of Welsh I. Phonology and Morphology. This course will treat the phonological and morphological structure of Modern Spoken Welsh, with greater or lesser reference to current theoretical literature on these topics, depending on the background and interests of the participants. Some background in linguistics is desirable. 405: Structure of Welsh II. Syntax. This course will treat the syntax of Modern Spoken Welsh, with greater or lesser reference to current literature on these topics, depending on the background and interests of the participants. Some background in linguistics is desirable. The two courses may be taken independently.

WELSH 411 Reading in Modern Welsh
Fall or spring. 2 credits. Prerequisite: permission of instructor. W. Harbert.
Topics are selected on the basis of student needs.

Yoruba

 Fees. A small fee may be charged for photocopied texts for course work.

YORUB 121–122 Elementary Yoruba
(also Africana Studies and Research Center 131–132)
121, fall; 122, spring. 4 credits each term. Prerequisites for Yoruba 123, Yoruba 122 or equivalent; for Yoruba 203, Yoruba 123 or equivalent. V. Carstens.

Foundations provided in all basic language skills, with an emphasis on speech and aural comprehension. Classes provide speaking and listening practice.

YORUB 123–203 Continuing Yoruba (also Africana Studies and Research Center 133–134)
123, fall; 203, spring. 4 credits each term. Prerequisites for Yoruba 123, Yoruba 122 or equivalent; for Yoruba 203, Yoruba 123 or equivalent. V. Carstens.
Building on 121–122, this is an all-skills course with a functional emphasis. Class will be conversational.

Zulu

 Fees. A small fee may be charged for photocopied texts for course work.

[ZULU 121–122 Elementary Zulu (also Africana Studies and Research Center)]
121, fall; 122, spring. 4 credits each term. Prerequisites for Zulu 122, Zulu 121 or equivalent. Not offered 1995–96.

Foundations provided in all basic language skills, with an emphasis on speech and aural comprehension. Classes provide speaking and listening practice.

[ZULU 123–203 Continuing Zulu (also Africana Studies and Research Center)]
123, fall; 203, spring. 4 credits each term. Prerequisites for Zulu 123, Zulu 122 or equivalent; for Zulu 203, Zulu 123 or equivalent. Not offered 1995–96.

Building on 121–122, this is an all-skills course with a functional emphasis. Class will be conversational.

MUSIC


Musical Performance and Concerts

Musical performance is an integral part of Cornell's cultural life and an essential part of its undergraduate academic programs in music. The department encourages music making through its offerings in individual instruction and through musical organizations and ensembles that are directed and trained by members of the faculty. Students from all colleges and departments of the university join with music majors in all of these ensembles:
Chamber Music Ensembles
Cornell Chamber Orchestra
Cornell Chorale
Cornell Gamelan Ensemble
Cornell Jazz Ensembles
Cornell Symphony Orchestra
Cornell University Chamber Winds
Cornell University Chorus
Cornell University Glee Club
Cornell University Symphonic Band
Cornell University Wind Ensemble
Cornell University Wind Symphony
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 university is also home to many student-run musical organizations, including the Big Red Marching Band and Big Red Pep Band, the Cornell Savoyards, and several a cappella groups. Information about these groups is available through the Department of Music office, 104 Lincoln Hall (255-4097).

The Department of Music and the Faculty Committee on Music sponsor more than one hundred formal and informal concerts each year by Cornell's ensembles, faculty, and students and by distinguished visiting artists. The majority of concerts are free and open to the public. Lectures and concerts are listed in special monthly posters, CUNINFO and other campus media.

Nonmajors

In addition to its performing, instructional, and concert activities, the department offers numerous courses for nonmajors, many of which carry no prerequisites and presuppose no previous formal training in music. Consult the following course listings, and for further information apply to the department office, 104 Lincoln Hall (255-4097), or to the director of undergraduate studies.

The Major

Two options are available to the student planning to major in music. Each carries the study of music to an advanced level through the integration of performance, music theory, and music history. Option I is a general course, not necessarily oriented toward eventual graduate or professional work in music. Option II is a more specialized and concentrated program, suitable for students who want to prepare for graduate or professional work in music.

All students contemplating a major in music under either option should arrange for placement examinations and advising in the department as early as possible, usually during the freshman orientation period. Information is available from the director of undergraduate studies, Professor Martin Hatch, 101 Lincoln Hall (255-3671) or from the chair, 106 Lincoln Hall (255-3671). All students are expected to have chosen an advisor 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 completion of Music 152 and 154, at the latest, by the end of the sophomore year (the freshman year is preferable), with an average grade of B- or better in each course. (Beginning in 1995-96, the piano proficiency exam formerly required by the department is incorporated into Music 154. However, students who completed Music 152 in spring 1995 or earlier will still pass a separate piano proficiency exam before being accepted into the major. For further information, apply to the department office, 104 Lincoln Hall.)

The requirements for the Bachelor of Arts degree with a major in music under Option I comprise the following:

1) in music theory: Music 251, 252, 253, 254, 351, 353, and one of the following: Music 451, 452, 453, 454, 456, 463.
2) in music history: sixteen credits in courses numbered 381 or above listed under Music in History and Culture. At least three of these courses must be drawn from the four-course sequence Music 381-384.
3) in performance: four semesters of participation in a musical organization or ensemble sponsored by the Department of Music or by Cornell's ensembles.

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 and 254, 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 by a successful sor recital before the end of the sophomore year.

The requirements for the Bachelor of Arts degree with a major in music under Option II are:

1) completion of all the requirements for Option I, except as noted below, and
2) in addition:
   a) in performance:
      (1) the requirement for four semesters of participation in a musical organization or ensemble is waived (but such majors are expected to participate actively in chamber and other ensembles sponsored by the department);
      (2) sixteen credits in individual instruction in the student's major instrument, or voice, earned by taking Music 391-392 throughout the junior and senior years
   b) in theory and composition or in history: twelve additional credits in this area of concentration at the 300 level or above, of which either four may be earned in Music 301 or 302 when taken once for four credits, or eight may be earned in Music 401-402.

Honors.

The honors program in music is intended to provide special distinction for the department's ablest undergraduate majors. To become a candidate for honors in music, a student must be invited by the faculty at the beginning of the second semester of the junior year. As soon as possible thereafter, the student will confer with an advisor or more faculty members to guide and evaluate the honors work. In the senior year the candidate will enroll in Music 401-402 with the chair of the honors committee as instructor. Candidates will be encouraged to formulate programs that allow them to demonstrate their musical and scholarly abilities, culminating in an honors thesis, composition, or recital, to be presented not later than April 1 of the senior year. A comprehensive examination administered by the honors candidate's committee will be held not later than May 1. The level of honors conferred will be based primarily on the candidate's performance in the honors program, and secondarily on the candidate's overall record in departmental courses and activities.

Distribution Requirement

College of Arts and Sciences students may apply either one or two Music Department courses toward the distribution requirement in Group 4 (humanities and the arts). Neither freshman seminars nor advanced placement credit count toward this requirement.

If one music course is counted for distribution, it must carry at least 3 credits, and it may not be in musical performance (Music 321-322, 391-392) or in organizations and ensembles (Music 531 through 346 and 421 through 446).

If two music courses are counted for distribution, they must total at least 6 credits, and at least one of the courses must be academic, not performance-oriented. The second "course," however, may be a collection of up to 4 credits earned in performance (Music 321-322, 391-392) or a collection of up to 3 credits earned in organizations and ensembles (Music 331 through 346 and 421 through 446), but not both.

Facilities

Music Library. The Music Library, in Lincoln Hall, has an excellent collection of standard research tools. Its holdings consist of approximately one hundred thousand books, periodicals, and scores and forty thousand sound and video recordings. Particularly noteworthy are the collections of opera from all periods; twentieth-century scores and recordings; a large microfilm collection of Renaissance sources, both theoretical and musical; and a collection of eighteenth-century chamber music. In addition, the Department of Rare Books, in the Kroch Library, houses a collection of early printed books on music and musical manuscripts.

Concert Halls. The Department of Music sponsors more than one hundred concerts annually. Cornell's principal concert halls are Bailey Hall Auditorium (about 2,000), Alice, and Barnes Hall Auditorium (about 280).

Rehearsal Spaces. The orchestras and bands rehearse in Bailey Hall, Barnes Hall, and Barton Hall; the Jazz Ensembles, Gamelan, and Chamber Ensembles rehearse in Lincoln Hall; and the choral ensembles are quartered in Sage Chapel. Eleven practice studios in Lincoln Hall are available for individual practice by pianists, vocalists, and instrumentalists. Twenty-two grand pianos and eight upright or studio pianos are housed in Cornell's offices, classrooms, and rehearsal spaces. In addition,
our Center for Keyboard Studies includes two concert grand pianos (Steinway and Mason & Hamlin), two eighteenth-century fortepiano replicas (copies of Johann Andreas Stein and Anton Walter), an original Broadwood grand piano from 1827, a Bösendorfer grand piano from 1842, one Dowd and one Hubbard harpsichord, and a Chaliss clavichord. Barnes Hall houses a chamber organ by Derwood Crocker and a self-contained tracker organ by Sethlager. A large Aeolian Skinner organ is located in Sage Chapel and there is a Helmuth Wolff tracker organ in Anabel Taylor Chapel.

Digital/Electronic Equipment. A Macintosh Master studio is available for graduate student use (hours to be arranged) and occasional independent study use. The software used is Performer, Mosaic, Finale, and several Opcode patch editor/librarians. The instruments include a Yamaha KX08 MIDI Controller keyboard, a Yamaha TX802 FM synthesizer, an E-Mu Proteus XR, a Casio FZ-10M sampler and multi-timbral sequencer. In addition, there are two MIDI work stations with additional instruments, including a Korg M1 synthesizer and an Akai S900 sampler.

Freshman Seminars

MUSIC 111 Sound, Sense, and Ideas
Music in Politics: fall and spring. 3 credits. K. Richards. Music in Culture: Spring. 3 credits. N. Nadeau.

Music in Politics: Even the symphonic form...can be said to have a bearing on politics (D. Shoastovich).

Tipper Gore recently brought the question of music censorship into our political arena. The hypercritical concern with language or style in song, however, are but one vehicle through which music can communicate. In fact, music as distant from Tipper’s hit list as that of Beethoven can be invested with social and political significance.

This course will examine various ways that music and politics have overlapped throughout history, with emphasis on the “classical” music of our concert halls and theaters. Writing assignments will explore how composing, performing, or listening to such music might be construed as having political meaning, and how we might address these questions in our musical enjoyment.

Music in Culture: Title: What’s the Alternative? Pop Music, Pop Rituals, Pop Culture
If alternative rock is a mirror for Generation X, what does it make them out to be? The distorted phantoms of a funhouse? Flat, grey, pore-riddled faces transfixed by a fluorescent light in the bathroom? Invisble spirits—vampires staring into an empty glass? On the light in the bathroom? Invisible spirits—

MUSIC 101 The Art of Music #
Fall. 3 credits. M W 11:15-12:05. 1-hour disc to be arranged. M. Hatch.


MUSIC 103 Introduction to the Musics of the World @
Spring. 3 credits. No previous training in music required. T R 11:15-12:05 plus 1 hr. to be arranged. B. R. Lange.

Exploration of musical genres from selected regions of the world. The course examines both the elements of musical styles and the features of society that influence music. Listening assignments and projects that investigate the cultural context of music are major components of the course.

MUSIC 105-106 Introduction to Music Theory
105, fall or summer, spring. 3 credits each term. Experience in reading music is highly recommended. Prerequisite for Music 106: grade of B- or better. Music 106 is limited to 50 students. Music 106 not offered 1995-96.

W. Cowdry.

An elementary, self-contained introduction to music theory emphasizing fundamental musical techniques, theoretical concepts, and their application. Music 105: notation, pitch, meter, intervals, scales, triads, basic concepts of tonality; extensive listening to music in various styles; analysis of representative works of Bach, Mozart, Beethoven, and Debussy. Music 106: systematic introduction to writing tonal harmony and melody; ear training.

MUSIC 108 Bach to Debussy #
Spring. 3 credits. prerequisite: Music 105 or permission of instructor. R. Harris-Warrick.

A chronological survey of major works in the Western concert repertory for all arts, from works of Bach and Handel that embody the newly consolidated language of tonality to works of Debussy and Stravinsky that signal the beginning of new strategies for many composers of the twentieth century.

MUSIC 115 Popular Musics Today
Fall. 3 credits. D. Brackett.

In this seminar, we examine some types of music that are popular today in (primarily) North America and Western Europe. We discuss the diverse functions and the different meanings of popular music in society. Specific issues will include the meanings of music videos, the relationship between popular music and American culture, and representation of race and gender in popular music. Members of the class will get to provide some of the pieces or types of music for our consideration. We will discuss and experiment with various modes of writing about popular music, and we will read criticism, description, and analysis of popular music in current magazines and newspapers, as well as academic essays on the sociology and musicology of popular music.

Introductory Courses

Note: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

MUSIC 101 The Art of Music #
Fall. 3 credits. M W 11:15-12:05. 1-hour disc to be arranged. M. Hatch.


MUSIC 103 Introduction to the Musics of the World @
Spring. 3 credits. No previous training in music required. T R 11:15-12:05 plus 1 hr. to be arranged. B. R. Lange.

Exploration of musical genres from selected regions of the world. The course examines both the elements of musical styles and the features of society that influence music. Listening assignments and projects that investigate the cultural context of music are major components of the course.

MUSIC 105-106 Introduction to Music Theory
105, fall or summer, spring. 3 credits each term. Experience in reading music is highly recommended. Prerequisite for Music 106: grade of B- or better. Music 106 is limited to 50 students. Music 106 not offered 1995-96.

W. Cowdry.

An elementary, self-contained introduction to music theory emphasizing fundamental musical techniques, theoretical concepts, and their application. Music 105: notation, pitch, meter, intervals, scales, triads, basic concepts of tonality; extensive listening to music in various styles; analysis of representative works of Bach, Mozart, Beethoven, and Debussy. Music 106: systematic introduction to writing tonal harmony and melody; ear training.

MUSIC 108 Bach to Debussy #
Spring. 3 credits. prerequisite: Music 105 or permission of instructor. R. Harris-Warrick.

A chronological survey of major works in the Western concert repertory for all arts, from works of Bach and Handel that embody the newly consolidated language of tonality to works of Debussy and Stravinsky that signal the beginning of new strategies for many composers of the twentieth century.

MUSIC 120 Learning Music through Digital Technology
Fall or spring. 3 credits. Enrollment limited. Prerequisite: permission of instructor. D. Brackett.

This course uses selected commercially available technological resources to produce live music. The student is expected to master the Macintosh computer, several music software programs, and several synthesizers using MIDI. The ability to read music is helpful but not necessary. There are no papers to write; homework is presented in three classroom concerts. The final is a live presentation of the student’s final project in a concert open to the public.

Music Theory

Students contemplating the music major are strongly advised to take Music 151, 152, 153, and 154 in the freshman year, but in any case to complete Music 152 and 154 no later than the end of the sophomore year. Students contemplating Option II must complete Music 252 and 254 by the end of the sophomore year.

MUSIC 151 Tonal Theory I
Fall. 3 credits. Prerequisites: admission by departmental placement exam; and concurrent enrollment in or previous credit for Music 153, or equivalent. Intended for students expecting to major in music and other qualified students. M W F 9:05-9:55. A. Richards.

Detailed study of the fundamental elements of tonal music: rhythm, scale, interval, triads, melodic principles and 2-part counterpoint, diatonic harmony and 4-part voice leading in root position and first inversion, analysis of phrase and period structure.

MUSIC 152 Tonal Theory II
Spring. 3 credits. Prerequisites: Music 151 and 153 or equivalent, and concurrent enrollment in or previous credit for Music 153, or equivalent. Intended for students expecting to major in music and other qualified students. A grade of B- or better in Music 152 is required for admission to the music major. M W F 9:05-9:55. A. Richards.

Continued study of voice leading, including diatonic modulation; analysis of binary and ternary forms.

MUSIC 153 Musicianship I
Fall. 2 credits. Prerequisite: concurrent enrollment in or previous credit for Music 151. Intended for students expecting to major in music and other qualified students. 3 hrs. TBA. A. Richards.


MUSIC 154 Musicianship II
Spring. 2 credits. Prerequisite: concurrent enrollment in or previous credit for Music 152. Intended for students expecting to major in music and other qualified students. A grade of B- or better in Music 154, and failure in none of the individual musicianship components of the course, are required for admission to the music major. 3 hrs. TBA. A. Richards.

Sight singing: longer melodies in 3 clefs, including diatonic modulation. Keyboard.

438 ARTS AND SCIENCES - 1995-1996
There are three classroom concerts, some
This course is a study of traditional contrapuntal
terms by Debussy, employing diatonic pivot chords. Dictation:
the present, with emphasis on the structures
and twelve-tone technique, set theory and
was covered.

MUSIC 222 A Survey of Jazz
Spring. 3 credits. Enrollment limited.
K. Hester.
This course will trace the evolution of jazz
including dissonant counterpoint, serialism,
called. Includes ear training, work at the
MUSIC 253 Musicianship V
Fall. 2 credits. Prerequisite: concurrent
composition in the polyphonic vocal style of
Chromatic harmony; analysis of eighteenth-
and in the larger forms, especially variations
and voice analysis and a final public concert.

MUSIC 251 Tonal Theory III
Fall. 3 credits. Prerequisites: Music 152 and
score reading: 3 parts using treble, alto, and
MUSIC 253 Musicianship III
Fall. 2 credits. Prerequisite: concurrent
involving treble, alto, tenor, and bass clefs.
Musical terms: orchestral ranges, terms, clefs,
and transpositions.

MUSIC 254 Musicianship IV
Spring. 2 credits. Prerequisite: concurrent
involving treble, alto, tenor, and bass clefs.
Musical terms: orchestral ranges, terms, clefs,
and transpositions.

MUSIC 250 Materials of Twentieth-Century Music
Fall. 3 credits. Prerequisite: Music 252 and
A study of selected works by leading
eighteenth and nineteenth-century composers. Readings will
may wish to study only performance techniques on the
gamelan.

MUSIC 278 Music of the Baroque Period
Spring. 3 credits. Prerequisite: any three-credit music course or permission of
A study of selected works by J. S. Bach and other composers of the seventeenth and
to four-part counterpoint. Score reading: 4 parts
using treble, alto, tenor, and bass clefs.
Musical terms: orchestral ranges, terms, clefs,
MUSIC 455 Orchestration
Spring. 4 credits. Prerequisite: Music 251 or
MUSIC 453 Introduction to Improvisational Theory
Fall. 4 credits. Prerequisite: Music 251 or
composition using models from the Classical and
Romantic repertoire and employing
harmonic resources: introduction to the
MUSIC 350 Music in History and Culture
Fall. 3 credits. Enrollment limited.
K. Hester.
This course will trace the evolution of jazz
historically from its African roots to the current
diverse spectrum of twentieth-century jazz.

MUSIC 245 Gamelan in Indonesian History and Cultures
Fall or spring. 3 credits. No previous
knowledge of musical notation or performance
experience necessary.

MUSIC 481 Counterpoint
Fall. 4 credits. Prerequisite: Music 251 or
MUSIC 452 Topics in Music Analysis
Fall. 4 credits. Prerequisite: Music 251 or
Key: continuation of chromatic harmony; atonal sets and
MUSIC 439
MUSIC 285 Music in the Middle Ages #
Fall. 3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1995–96.

MUSIC 286 Music in the Renaissance #
Spring. 3 credits. Prerequisite: any three-credit music course or permission of instructor. Not offered 1995–96.

MUSIC 287 Mozart #
Spring. Prerequisite: any three-credit music course or permission of instructor. 3 credits. N. Zaslaw.
A chronological tour of the life and works of Wolfgang Amadeus Mozart by means of original documents, scores, recordings, and live performances. As a postlude, an evaluation of Peter Shaffer's play and movie Amadeus will be undertaken.

MUSIC 372 Mind and Memory: Explorations of Creativity in the Arts and Sciences (also English 301, Theater Arts 301)
Spring. 4 credits. J. McConkey. For description see English 301.

MUSIC 374 Opera and Culture (also German Studies 374) #
Spring. 4 credits. Prerequisite: any three-credit music course or proficiency in German or Italian. A. Groos. For description see GERST 374.

Music History Courses for Majors and Qualified Non-Majors
Prerequisite: Music 152 or permission of instructor. Intended primarily for music majors, these courses will investigate selected topics and repertories from each period in some detail. Each course will include listenings, readings, oral and written papers, and analyses.

MUSIC 381 Music in Western Europe to 1700 #
Western European music from the Middle Ages to the early Baroque, including Gregorian chant, secular monophony, the development of polyphony, the birth of opera, and the rise of independent instrumental music.

MUSIC 382 Music of the Eighteenth Century #
Spring. 4 credits. N. Zaslaw.
Music in Western and Central Europe and North America from Bach, Handel, Rameau and Vivaldi to Haydn and Mozart, including comic and serious opera, church music, concert music, and social music.

MUSIC 383 Music of the Nineteenth Century #
Fall. 4 credits. Not offered 1995–96.

MUSIC 384 Music of the Twentieth Century

MUSIC 388 Historical Performance Practicum #

MUSIC 398-399 Independent Study in Music History
398, fall; 399, spring. 4 credits. Prerequisite: Music 152 and permission of instructor. Staff. Advanced study of various topics in music history. Students enrolling in Music 398-399 participate in, but do not register for, an approved 200-level music history course and, in addition, pursue independent research and writing projects.

MUSIC 413 African American Music Innovators
This course examines and experiments with methods of analyzing, appreciating, and understanding innovative art forms. Students will write three reports (with transcribed music examples in each form of accurate analytical charting, where appropriate), utilizing three different perspectives on African American Music.

MUSIC 480 Music in Hungary and Eastern Europe
Fall. 4 credits. Prerequisite: Music 152 or permission of the instructor. T R 1:25-4:00. B. R. Lange.
Folk, art, and popular music in Hungary and related countries.

Independent Study

MUSIC 301-302 Independent Study in Music
301, fall; 302, spring. Credit to be arranged. Prerequisite: departmental approval. Presupposes experience in the proposed area of study. Staff.

Honors Program

MUSIC 401-402 Honors in Music
401, fall; 402, spring. 4 credits each term. Limited to honors candidates in their senior year. Staff.

Musical Performance
Cornell faculty members offer individual instruction in voice, organ, harpsichord, piano and fortepiano, violin, viola, cello, viola da gamba, and some brass instruments to those students advanced enough to do college-level work in these instruments. Lessons are available by audition only. They may be taken either without credit or, through Music 321-322, with credit. Other instruments may sometimes be studied for credit outside Cornell, but again by audition only (see Music 311h-322h). Cornell does not offer instruction at the beginner's level.

Lessons for beginners. The Music Department can recommend outside teachers for those who wish to begin studying voice or an instrument. No credit is available for beginning instruction.

Auditions. Auditions are held at the beginning of each term for lessons for advanced students. Contact the Department of Music office (104 Lincoln Hall) for information.

Fees. The fee for a one-half-hour lesson weekly, without credit, is $100 per term. For a one-hour lesson (or two half-hour lessons) weekly, without credit, the fee is $200. The fee in Music 321-322, for a one-hour lesson (or two half-hour lessons) for credit is $300 per term. All fees are non-refundable once lessons begin, even if the course is subsequently dropped.

Scholarships. Music majors receive a scholarship equal to the lesson fee listed above. Members of the department-sponsored organizations and ensembles may, with the permission of the director of the organization, receive a scholarship of up to one-half the Cornell fee for the type of lessons chosen during the term. These scholarships are intended only for lessons in the student's primary performing medium. Scholarship forms, available in the Music Department office, are to be returned to the office within the first three weeks of classes.

Practice rooms. Practice-room fees for twelve hours weekly are $40 per term and for six hours weekly are $20 per term for a room with a piano. Practice-room fees for twelve hours weekly are $20 per term and for six hours weekly are $10 per term for a room without a piano. The fee for the use of the pipe organ is $75 for twelve hours weekly and $50 for six hours weekly. All fees are non-refundable.

Earning credit. For every 4 credits earned in Music 321-322, the student must have earned, or currently be earning, at least 3 credits in another music course (excluding freshman seminars, Music 321-322, 331 through 340, 391-392, or 421 through 448). These 3 credits must be earned prior to, or simultaneously with, the first 2 credits in 321-322; they cannot be applied retroactively. No exceptions are made, but transfer credit for appropriate music courses already taken elsewhere may be used to satisfy this requirement with the approval of the department.

Lessons taken outside Cornell. Under certain conditions, advanced students may earn credit for lessons taken outside Cornell. An audition is required, and no credit can be granted for beginning instruction. For further information, read the description of Music 321h-322h and contact the Music Department office.

MUSIC 321-322 Individual Instruction in Voice, Organ, Harpsichord, Piano, Strings, Woodwinds, and Brass
Prerequisite: Advanced students may register only after a successful audition with the instructor, usually scheduled during the first week of classes. Students may register for this course in successive years.

Students, at the sole discretion of the instructor, earn 2 credits each term for a one-hour lesson (or two half-hour lessons) weekly accompanied by an appropriate practice schedule.

MUSIC 321a-322a Individual Instruction in Voice
321a, fall; 322a, spring. 2 credits each term. Prerequisite: successful audition during registration. Limited enrollment. J. Kellock.
The Vocal Coaching Program offers non-credit lessons to members of the choral ensembles.

MUSIC 321b-322b Individual Instruction in Organ
321b, fall; 322b, spring. 2 credits each term. Prerequisite: successful audition. A. Richards.

MUSIC 321c-322c Individual Instruction in Piano
321c, fall; 322c, spring. 2 credits each term. Prerequisite: successful audition. M. Bilson, X. Bjorken and staff.

MUSIC 321d-322d Individual Instruction in Harpsichord
321d, fall; 322d, spring. 2 credits each term. Prerequisite: successful audition. A. Richards.
MUSIC 321e–322e Individual Instruction in Violin or Viola
321e, fall; 322e, spring. 2 credits each term. Prerequisite: successful audition. S. Monosoff.

MUSIC 321f–322f Individual Instruction in Cello
321f, fall; 322f, spring. 2 credits each term. Prerequisite: successful audition. J. Hu, fall; S. Vial, spring.

MUSIC 331g–332g Individual Instruction in Brass
331g, fall, not offered fall 1995, 332g, spring. 2 credits each term. Prerequisite: successful audition. M. Scattered, spring.

MUSIC 321h–322h Individual Instruction outside Cornell
321h, fall; 322h, spring. 2 credits each term. Prerequisite: permission of instructor. Registration is permitted in two of these courses simultaneously and a list of approved teachers, consult the department office, 104 Lincoln Hall.

MUSIC 391–392 Advanced Individual Instruction
391, fall; 392, spring. 4 credits each term. Open only to juniors and seniors majoring in music under Option II with concentration in performance and to graduate students. Option II majors whose lessons must be taken outside Cornell may apply to the department for financial assistance toward the cost of lessons; $150 per semester will normally be awarded to such students and a larger amount may be awarded under certain circumstances. Music 391 is not a prerequisite to 392.

Musical Organizations and Ensembles
Students may participate in musical organizations and ensembles throughout the year. Permission of the instructor is required, and admission is by audition only, except that the Sage Chapel Choir and the Cornell Gamelan Ensemble are open to all students without prior audition. Registration is permitted in two of these courses simultaneously and students may register in successive years, but no student may earn more than 6 credits in these courses. Membership in these musical organizations and ensembles is also open to qualified students who wish to participate without earning credit. 

MUSIC 331–332 Sage Chapel Choir
331, fall or summer; 332, spring. 1 credit. No audition for admission. W. Cowdery.

MUSIC 333–334 Cornell Chorus or Glee Club
333, fall; 334, spring. 1 credit. Prerequisite: permission of instructor. Chorus (treble voices): W 5:15–7:15 p.m. plus 2 hours to be arranged. Glee Club (men's voices): W 7:30–9:30 p.m., plus 2 hours to be arranged. S. Tucker.

MUSIC 335–336 Cornell Symphony Orchestra
335, fall; 336, spring. 1 credit. Prerequisite: permission of instructor. W 7:30–10:00 p.m. E. Murray.

MUSIC 337–338 University Bands
337, fall; 338, spring. 1 credit. Prerequisite: permission of instructor. Wind symphony: fall M 4:45–6:30 p.m. Symphonic band: spring M 4:45–6:30 p.m. Wind ensemble: spring M 7:30–9:30 p.m. and R 7:30–9:30 p.m. Fall. D. Conn, spring. M. Scattered.

MUSIC 329–340 Cornell Jazz Ensembles
329, fall; 340, spring. 1 credit. Prerequisite: permission of instructor. W 6–8 p.m. K. Hester.

MUSIC 441–442 Cornell Gamelan Ensemble
441 fall; 442 spring. 1 credit each term. Enrollment limited. Prerequisite: Music 245 or 245, or permission of instructor. R 7:30–10:00 p.m. Staff. Advanced performance on the Javanese gamelan. Tape recordings of gamelan and elementary number notation are provided. Some instruction by Indonesian musicians is offered in most years.

Graduate Courses
Open to qualified undergraduates with permission of instructor.

MUSIC 601 Introduction to Bibliography and Research
Fall. 4 credits. L. Coral. This course explores the nature of the discipline and introduces the many types of bibliographic tools needed to pursue research in music.

MUSIC 602 Analytical Technique
Spring. 4 credits. E. Murray. A critical survey of various analytical methods in current use. Frequent analytical assignments and class presentations.

MUSIC 603 Editorial Practice

MUSIC 604 Ethnomusicology: Areas of Study and Methods of Analysis
Spring. 4 credits. Open to graduate students in anthropology, linguistics, psychology, sociology, and other cognate fields with permission of instructor. Not offered 1995–96.

MUSIC 620 Introduction to MIDI Techniques
Spring. 4 credits. Permission of instructor. D. Borzen. This course is an introduction to MIDI for students who are already at a very advanced level in music composition.

MUSIC 622 Historical Performance Practicum

MUSIC 653 Topics in Tonal Theory and Analysis

MUSIC 654 Topics in Post-tonal Theory and Analysis

MUSIC 657–658 Composition
657, fall; 658, spring. 4 credits each term. F 1:25–4:00 p.m. plus 1 hour to be arranged. Fall, S. Stucky; spring, R. Sierra.

MUSIC 677 Mozart: His Life, Works, and Times (also German 757)
Fall. 4 credits. Not offered 1995–96.

MUSIC 680 Topics in Ethnomusicology

MUSIC 681 Seminar in Medieval Music
Fall. 4 credits. M 1:25–4:00. M. Long.

MUSIC 684 Seminar in Renaissance Music
Fall. 4 credits. Not offered 1995–96.

MUSIC 686 Seminar in Baroque Music
The Department
The Department of Near Eastern Studies (360 Rockefeller Hall, 225-6275) offers courses in the archaeology, civilization, history, languages, and literatures of the Near East. Students are encouraged to take an interdisciplinary approach to the cultures of this region, which has had an important impact on the development of our own civilization, and which plays a vital 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.

Distribution Requirements
Any two Near Eastern Studies history or archaeology courses at the 200, 300 or 400 level that form a reasonable sequence or combination satisfy the distribution requirement in the humanities. NES 197 or NES 198 plus any other Near Eastern studies course will constitute a sequence to fulfill the distribution requirement in either social sciences/history or humanities, depending on the second course used in combination with NES 197 or 198. All 200 or 300-level language courses may fulfill the humanities requirement.

The Major
The precise sequence and combination of courses chosen to fulfill the major is selected in consultation with the adviser. All majors must satisfy the following requirements (no course may be used to satisfy two requirements; S-U options not permitted):

A. Qualification in two Near Eastern Studies languages or Proficiency in one.

B. Nine three- or four-credit NES courses, which must include the following:

1. NES 197 or 198. (When NES 197-198 are not offered, students may substitute a third 200-level survey course with the approval of the director of undergraduate studies.

2. Two 200-level NES survey courses, one whose chronological parameters fall within the period 3000 B.C.E. to 600 C.E., and one whose chronological parameters fall within the period 600 C.E. to 1500 C.E. (Other examples (a complete list can be obtained in the department office):

   - 3000 B.C.E. to 600 C.E.
   - NES 223, Introduction to the Bible
   - NES 263, Introduction to Biblical History and Archaeology
   - NES 248, Introduction to Classical Jewish History
   - 600 C.E. to the present
   - NES 233, The Lyrics of Love and Death: Medieval Hebrew and Arabic Poetry in Translation
   - NES 257, Islamic History 600-1258
   - NES 258, Islamic History 1258-1914
   - NES 294, Modern History of the Near East

3. At least two NES courses at the 300 level or above (only one of which may be NES 301, 302, 311, or 312).

Prospective majors should discuss their plans with the director of undergraduate studies before formally enrolling in the department. To qualify as a major, a cumulative grade average of C or better is required.

Honors. Candidates for the degree of Bachelor of Arts with honors in Near Eastern Studies must fulfill the requirements of the appropriate major study and enroll in the honors course, NES 499, in the fall and spring semesters 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 overall 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.

Study abroad. Near Eastern Studies majors may choose to study in the Near East in their junior year. There are various academic programs in the countries of the Near East that are recognized by the Department of Near Eastern Studies and that allow for the transfer of credits. Archaeological field work on Cornell-sponsored projects in the Near East or recognized field schools in Israel may also qualify for course credit.

Freshman Seminar

NES 127 What's Love Got To Do With It? Marriage and Courtship in the Hebrew Bible

Spring. 3 credits. Freshman Seminar. Enrollment limited to 17 students. C. Smith.

The direction, tension of marriage delighted, disappointed, and often baffled the authors of the Hebrew scriptures. In this course we will read selections from the Hebrew Bible (in translation) and examine the portrayal of courtship and marriage in its laws, poetry, and narratives.

Language Courses

NES 101-102 Elementary Modern Hebrew I and II (also Jewish Studies 105-106)

101, fall; 102, spring. 6 credits each term. Prerequisite for NES 101 (also restricted to students with NES 105). Freshman Seminar. Enrollment limited to 15 in each session. C. Smith.

Intended for beginners. This course provides a thorough grounding in reading, writing, grammar, oral comprehension and speaking. Students who complete the course will be able to function in basic situations in a Hebrew-speaking environment.

NES 111-112 Elementary Arabic I and II

111, fall; 112, spring. Enrollment limited to 15 in each session. 6 credits each term. Prerequisite for Arabic 112: Arabic 111 or permission of instructor. M. Younes.

The course provides a thorough grounding in all language skills: listening, speaking, reading, and writing. It starts with spoken Arabic and gradually integrates Modern Standard Arabic in the form of listening and reading texts. Emphasis will be on learning the language through using it in meaningful contexts. The student who successfully completes the two-semester sequence will be able to: a) understand and actively participate in simple conversations involving basic practical and social situations (introductions, greetings, school, home and family, work, simple instructions, etc.) b) read Arabic material of limited complexity and variety (simple narrative and descriptive texts, etc.) c) write notes and short letters describing an event or a personal experience.

An important objective of the course is to familiarize students with basic facts about the geography, history, and culture of the Arab world.

NES 201-202 Intermediate Modern Hebrew I and II (also Jewish Studies 201-202)

201, fall; 202, spring. Enrollment limited to 15 students in each Section. 4 credits each term. Prerequisites for NES 201, 202 or permission of instructor: NES 201, 202 or permission of instructor. N. Scharf.
will explore a variety of poetical themes and Arab societies in the works of neoclassicist
This survey course is intended for students
This course employs a double perspective:
device.
ment." In this manner, students also will be
students. B. Hamad.
A sequel to NES 111-112. Continued
development of the four language skills
through extensive use of graded materials on
a wide variety of topics. Increasing attention
will be given to developing native-like
pronunciation and to grammatical accuracy,
but the main focus will be on developing
communication skills. The student who
successfully completes 212 will be able to:
1) understand and express himself or herself
in Arabic in his/her environment beyond the basic
needs; 2) read and comprehend written Arabic
of average difficulty; 3) write a letter, a summary
of a report or a reading selection. An
appreciation of Arabic literature and culture
will be sought through the use of authentic
materials.

[NES 217-218 Intermediate Turkish I
and II @]
217, fall; 218, spring. Limited to 15
students. 4 credits each term. Not offered

NES 301-302 Advanced Modern Hebrew
I and II (also Jewish Studies
301-302) @
301, fall; 302, spring. Limited to 15
students. 4 credits each term. Prerequisite
for NES 301: 202 or equivalent, with
permission of instructor. Prerequisite for
NES 302: 301 or equivalent, with
permission of instructor. This sequence
may be used to fulfill the humanities
distribution requirement in literature.
Limited to 15 students. N. Scharf.
Advanced study of Hebrew through the
analysis of texts and expository prose.
This course employs a double perspective:
language is viewed through literature and
literature through language. Students
will develop composition skills by studying
language structures, idioms, and various
registers of style.

NES 310 Arabic Poetry @
Spring. 4 credits. Enrollment limited to 15
students. B. Hamad.
This survey course is intended for students
who have completed at least five semesters of
the Arabic language. The focus of the course
will be on modern poetry but occasional
reference will be made to classical poetry and
its relationship to contemporary poets. We
will explore a variety of poetical themes and
issues and their relevance to contemporary
Arab societies in the works of neoclassicist
and romantic poets, poets of the Diwan
school, and poets of the "Free Verse Move-
mant." In this manner, students also will be
introduced to the structural analysis of Arabic
(syntax, vocabulary, stylistic and rhetorical
devices).

NES 311 Advanced Arabic I @
Fall. 4 credits. Prerequisite: NES 212 or
permission of instructor. Limited to 15
students. B. Hamad.
Students will be introduced to authentic,
unedited Arabic language materials ranging
from short stories and official speeches and
to literary, historical, and compara-
tive issues. Emphasis will be on
developing fluency in oral expression through
lively discussions of socially and politically
provocative issues that are presented in the
reading selections. A primary objective will
be increased accuracy in pronunciation and
grammar.

[NES 312 Advanced Arabic II @
Spring. 4 credits. Limited to 15 students.
Prerequisite: NES 311, or permission of

NES 315 Arabic Writing @
Fall. 4 credits. Enrollment limited to 15
students. B. Hamad.
This course satisfies the needs of students
(native and non-native speakers of Arabic)
who have completed at least four semesters of
Arabic study at the college level. We will deal
with a wide range of authentic materials
chosen for their cultural significance and
appropriateness for student abilities. Empha-
sis will be placed on developing writing skills
through analysis of the structure of the
language, particularly its syntax and morphol-
ogy. Writing tasks will include dictation,
translation from English into Arabic (and vice
versa), as well as guided and free composi-
tion, such as writing personal and business
letters, summaries, and short reports.

NES 330-331 Hieroglyphic Egyptian
I and II @ #
330, fall; 331, spring. 4 credits each term.
G. Rendsburg.

An introduction to the language of the
hieroglyphic writings of ancient Egypt.
Students are introduced to the grammar and
script of hieroglyphic Egypt through the exercises
in A. H. Gardiner's Egyptian
Grammar. We then move to reading selected
prose tales such as the "Story of Sinuhe" and
the "Shipwrecked Sailor." Knowledge of a
Semitic language is helpful but not essential.

[NES 333-334 Elementary Akkadian
I and II (also NES 633-634) @ #
333, fall; 334, spring. 4 credits each term.
Prerequisite for NES 334: 333 or permis-
sion of instructor. Prerequisite for NES 634:
633 or permission of instructor. Not
offered 1995-96. D. Owen.]

[NES 335-336] Readings in Akkadian
Texts (also NES 635-636) @ #
335, fall; 336, spring. 4 credits each term.
Prerequisite for NES 336: 335 or permis-
sion of instructor. NES 636: 635 or permis-
sion of instructor. Not offered 1995-96.
D. Owen.]

[NES 337-338 Ugaritic I and II @ #
337, fall; 338, spring. 4 credits. Prerequi-
site: Knowledge of another Semitic
language (preferably Hebrew). Not
offered 1995-96. G. Rendsburg.]

[NES 341 Introduction to Arabic
Linguistics (also LING 512) @ #
Spring. 4 credits. Prerequisites: one year of
Arabic and an introductory course in
linguistics or permission of instructor. Not
offered 1995-96.]

NES 415 Structure of the Arabic
Language (also LING 514) @
Fall. 4 credits. Prerequisite: NES 112 or
one year of Arabic. M. Younes.
The course deals with the history of Arabic
and its place in the Semitic language family,
the sociolinguistic situation in the Arab world
(diglossia), Arabic phonology (sounds,
emphasis, syllable structure, and related
processes), morphology (verb forms and
derivational patterns), and syntax (basic
sentence structures, cases, and moods).

NES 420 Readings in Biblical Hebrew
Prose (also JWST 420 and RELST
420) @ #
Fall. 4 credits. Prerequisite: one year of
Hebrew, Biblical or modern. Course may
be repeated for credit. G. Rendsburg.
An advanced course in reading selected
portions of the Hebrew Bible. Emphasis will
be placed on the philological method,
with attention to literary, historical, and compara-
tive concerns.

[NES 433 Introductory Sumerian I (also
NES 631) @ #
Spring. 4 credits each semester. Prerequi-
site: permission of instructor. Not offered
1995-96. D. Owen.]

[NES 434 Introductory Sumerian II (also
NES 632) @ #
Spring. 4 credits. Prerequisite: NES 433/

Continued study of Sumerian grammar and
syntax, further readings in selected Sumerian
economic, legal, and historical inscriptions of
the late third millennium B.C.E.; additional
discussion of Sumerian civilization and
culture.

[NES 625 West Semitic Inscriptions
Fall. 4 credits. Prerequisite: knowledge of
Hebrew. Not offered 1995-96. G.
Rendsburg.]

[NES 631 Introductory Sumerian I (also
NES 633) @ #
Spring. 4 credits. Prerequisite: permis-
sion of instructor. Not offered 1995-96.
D. Owen.]

[NES 632 Introductory Sumerian II (also
NES 434)
Spring. 4 credits. D. I. Owen.
For description, see NES 434 under Near
Eastern Languages.

[NES 633-634 Elementary Akkadian
I and II (also NES 333-334)
633, fall; 634, spring. 4 credits each term.
Prerequisite for NES 634: 633 or permis-
sion of instructor. Not offered 1995-96.
D. Owen.]

[NES 635-636 Readings in Akkadian
Texts (also NES 635)
635, fall; 636, spring. 4 credits. Not offered
1995-96. D. Owen.]

[NES 637-638 Ugaritic I and II (also NES
337-338)
337, fall; 338, spring. 4 credits. Prerequisite:
Knowledge of another Semitic
language (preferably Hebrew). Not
offered 1995-96. G. Rendsburg.]

NEAR EASTERN STUDIES 443
Archaeology

**NES 247 Introduction to Jewish Art and Archaeology from the Hellenistic to the Rabbinic Period** (also Classics 249, Religious Studies 247, Archaeology 247) @

Fall. 3 credits. For description, see JWST 247. L. Kant.

**NES 261 Ancient Seafarers (also Archaeology 275)** @


**NES 263 Introduction to Biblical History and Archaeology** (also Archaeology 253, Jewish Studies 263, and Religious Studies 264) @


**NES 264 Agriculture and Society in the Ancient Near East** @


**NES 361 Interconnections in the Eastern Mediterranean World in Antiquity** @


**NES 366 The History and Archaeology of the Ancient Near East (also Archaeology 310)** @


**NES 367 The History and Archaeology of Ancient Egypt** @


Civilization

**NES 197–198 Introduction to Near Eastern Civilization** (also Jewish Studies 197 and Religious Studies 197–198) @

Fall. 3 credits each term. Required for all NES department majors. NES 197 or 198 and any other NES course will constitute a sequence to fulfill the distribution requirement in either the social sciences or humanities, depending on the second course used in combination with NES 197 or 198. Not offered 1995–96. R. Brann.

**NES 234 Arabs and Jews: Cultures in Confluence and Conflict** (also JWST 234, RELST 234, and COM L 234) @

Fall. 3 credits. R. Brann.

- This course examines the cultural and historical interaction between Arabs and Jews from the emergence of Islam in the seventh century down to the contemporary Middle East. The first part of the course will focus on the period of classical Islamic civilization and medieval Judaism under the orbit of Islam. The interaction of the two cultures (scriptural, spiritual, intellectual, literary, communal, and interpersonal) will be studied through readings of primary texts (in translation). The second part of the course deals with the cultural reawakening and the development of national consciousness of the two peoples in the last two centuries, discussing in detail the evolution of the conflict between Arabs and Jews in the Middle East and the ways in which that conflict is reflected in cultural life. We will also consider the role of historical memory in the modern conflict in light of the record of pre-modern interaction.

- **NES 246 Seminar on Jewish Mysticism** (Religious Studies 246) @


- **NES 247 Introduction to Jewish Art and Archaeology from the Hellenistic to the Rabbinic Period** (also Classics 249, Jewish Studies 247, Religious Studies 247, Archaeology 247) @

  Fall. 3 credits. L. Kant.

  For description, see JWST 247.

- **NES 251 Introduction to Islam: Religion, Politics, and Society** (also RELST 252) @

  Spring. 3 credits. Staff.

  After tracing the emergence of Islam as an historical phenomenon in the Near East, the course will focus on the intellectual traditions of Islamic civilization: theology, as reflected in the Qur'an and the writings of theologians; mysticism, as revealed in poems of Omar Khayyam and Rumi; and philosophy, as seen in the writings of Avicenna and Ibn Khaldun. Issues to be discussed will include the nature of theology, religious tolerance and pluralism, the status of women, and the ethics of jihad. Students will be introduced to the basic sources of Islamic civilization and the reference works essential to the study of those sources.

- **NES 281 Gender and Society in the Muslim Middle East (also Religious Studies 281, Women's Studies 281)** @


- **NES 320 Topics in Religion: Religious Symbols in Near Eastern Late Antiquity** (also JWST 340 and RELST 340) @

  Spring. 4 credits. Not offered 1995–96. L. Kant.

- **NES 324 The History of Early Christianity** (also Jewish Studies 344 and Religious Studies 325) @

  Fall. 4 credits. Not offered 1995–96. L. Kant.

- **NES 327 The Missions of Paul and His Successors** (also RELST 327) @

  Fall. 4 credits. L. Kant.

  With special focus on the Pauline tradition, we will examine Christianity in the first to early second centuries C.E. as a missionary religious movement, surveying its spread to various cities throughout the Graeco-Roman/Near Eastern world, such as Antioch, Ephesus, Colossae, Thessaloniki, Phillipi, Corinth, and Rome. Through a close reading of New Testament texts, we will investigate the different forms Christianity took in various places, noting its transformation from a Jewish missionary movement to a gentile one. Attention will be drawn to the following: the urban character of Christian missions; initiatory rites, such as baptism; the role of Jewish synagogues and of god-fearers; the opportunity to use it. But students with the background will have the opportunity to use it. We will also consider the role of historical memory in the modern conflict in light of the record of pre-modern interaction.

- **NES 330 Muslims, Christians, and Jews in Islamic Spain: Literature and Society** (also JWST 339, COM L 334, RELST 334, SPANL 339) @

  Spring. 4 credits. Enrollment limited to 20 students. R. Brann.

  Islamic Spain was a frontier society comprising six distinct ethnic-religious communities: Arabs, musalladun (native descendants of Iberian converts to Islam), Berbers, musta'ribun (Arabicized Christians), Jews and "Slavs" (European slave soldiers and their descendants). This course will examine the literature, culture, and society of al-Andalus (Islamic Spain) from the Umayyad emirate until the close of the Reconquista (711-1248). The development of Arabic (and Hebrew) poetry will be surveyed with focus on style, genres, and motifs. Conflicting theories of the origin and identity of Hispano-Arabic poetry and culture will also be considered.

- **NES 344 Jewish Mysticism** (also RELST 344 and JWST 342) @

  Spring. 4 credits. Enrollment limited to 25 students. R. Lesses.

  This course will discuss important manifestations of Jewish mystical thought and practice from its beginnings in Merkabah mysticism, to the medieval flowering of Kabbalah and the further development in Safedian Kabbalah, to Eastern European Hasidism. The emphasis will be on understanding both the theoretical and experiential aspects of Jewish mysticism and examining key texts in translation. We will also consider the place of Jewish mysticism within the larger religious phenomenon of mysticism.

- **NES 345 Gender and Judaism** (RELST 343 and JWST 347) @

  Fall. 4 credits. Enrollment limited to 25 students. R. Lesses.

  How does Judaism structure the roles of women and men differently? What are the historical roots of these roles and their various contemporary manifestations? How are traditional roles and symbols of both women and men being questioned by the contemporary Jewish feminist movement? This course offers a view of Judaism through the lens of contemporary gender issues, with a particular emphasis on the feminist revisioning of Judaism. We will begin with an introduction to Judaism as a religious tradition of women and men and then discuss specific issues in greater depth, presenting both origins and historical development and contemporary images and practice. Issues covered will include the differing roles of women and men in traditional Judaism, the gendered body in Judaism, Jewish feminism, family and sexuality, and the gender of God.

- **NES 348 Varieties of Judaism in the Graeco-Roman World** (also Jewish Studies 348 and Religious Studies 348) @

  Spring. 4 credits. Not offered 1995–96. L. Kant.

- **NES 351 Introduction to Islamic Law** (also NES 651, RELST 350, HIST 372/652) @


- **NES 357 Islamic Law and Society** @

Judaism, Neo-Orthodoxy; the character of the Mediterranean world; political, military, and cultural contacts between the Islamic Near East and western Europe.

[NES 250 Islamic History: 1258-1914 (also History 248 and Religious Studies 258) @ #]
Spring. 3 credits. Not offered 1995-96. L. Peirce.

[NES 261 Ancient Seafaring (also Archaeology 275) @ #]

[NES 264 Agriculture and Society in the Ancient Near East (also Government 358 and JWST 294)] @ 
Fall. 4 credits. Fulfills the college distribution requirement in history or the social sciences. E. Zisser.

This introductory course is designed to acquaint students with the main political, social, and cultural trends that have shaped the modern and contemporary history of the Near East. While discussing developments in the region during the nineteenth and twentieth centuries, the lectures will focus on such themes as modernization, nationalism, Islamic response, and Arab politics in global and regional contexts. The course does not presuppose any knowledge of Near Eastern languages.

[NES 327 The Missions of Paul and His Successors (also RELST 327)] @ 
Fall. 4 credits. Limited to 15 students. For description, see NES 327 under Near Eastern Civilization.

[NES 351 Introduction to Islamic Law (also NES 651, RELST 350, HIST 372/652)] @ 

This course deals with Arab nationalism, the creation of Arab nation-states, and the emergence of a regional, inter-Arab state system. We will examine the stages in the development of this system, including its crystallization during the 1920s and 1930s (the dynastic period), the establishment of the Arab league (including the tension between unity and diversity in the 1940s), the struggle over the region's orientation toward Eastern and Western blocs, the emergence of Nasserism in the 1950s, and the inter-Arab system's attitude to the conflict with Israel.

[NES 348 Introduction to Classical Jewish History (also RELST 248 and JWST 248)] @ 
Fall. 3 credits. R. Lesses.

A survey of the major developments in Jewish history between the destruction of the first temple in 586 B.C.E. and the rise of Islam. Topics will include the return under Ezra and Nehemiah; the encounter with Hellenism; the Anti-Jewish persecutions; the growth of Roman influence; the rebellion of 70 C.E.; the rise of such Jewish groups as the Sadducees, Pharisees, and Essenes; the conflict with early Christianity; and the nature of rabbinic Judaism.

[NES 249 Introduction to Modern Jewish History (also JWST 245)] @ 
Spring. 3 credits. R. Lesses.

A survey of the major developments in Jewish history between the expulsion from Spain (1492) until 1950. Topics will include the growth of mysticism and Hasidism; the development of Eastern European Jewry; the impact of emigration; the rise of Jewish pluralism, e.g., Reform Judaism, Conservative Judaism, Neo-Orthodoxy; the character of modern anti-Semitism; the origins and growth of American Jewry; and the beginnings of political Zionism.

[NES 257 Islamic History: 600-1258 (also HIST 254 and RELST 257)] @ 
Fall. 3 credits. D. Powers.

This course deals with Arab nationalism, the creation of Arab nation-states, and the emergence of a regional, inter-Arab state system. We will examine the stages in the development of this system, including its crystallization during the 1920s and 1930s (the dynastic period), the establishment of the Arab league (including the tension between unity and diversity in the 1940s), the struggle over the region's orientation toward Eastern and Western blocs, the emergence of Nasserism in the 1950s, and the inter-Arab system's attitude to the conflict with Israel.

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Genesis through 1 Kings. Emphasis is placed on literary, historical, and theological matters. Special use is made of the numerous archaeological discoveries that have advanced our knowledge of ancient Israel. As such, the Bible is studied against the backdrop of ancient Near Eastern literature, history, religion, mythology, law and culture.

[NES 227 Introduction to the Prophets (also Jewish Studies 227 and Religious Studies 227) (also Comparative Literature 221)] @
G. Rendsburg.)

[NES 228 Genesis (also Near Eastern Studies 228, Jewish Studies 228 and Religious Studies 228) (also Comparative Literature 221)] @
G. Rendsburg.)

[NES 233 The Lyrics of Love and Death: Medieval Arabic and Hebrew Poetry and Narrative (in Translation) (also Comparative Literature 333 and Jewish Studies 233)] @
R. Brann.)

NES 242 Jewish Literature and Thought in the Rabbinc Period (also JWST 242, RELST 242, and CLASS 243)] @
Spring. 3 credits. L. Kant.
For description, see JWST 242.

NES 310 Arabic Poetry @
Spring. 4 credits. B. Hamad.
For description, see NES 310 under Near Eastern Language.

NES 315 Arabic Writing @
Fall. 4 credits. B. Hamad.
For description, see NES 315 under Near Eastern Language.

NES 339 Muslims, Christians, and Jews in Islamic Spain: Literature and Society (also JWST 339, COMP LIT 334, RELST 334, SPAN LIT 339)] @
Spring. 4 credits. Enrollment limited to 20 students.
R. Brann.
For description, see NES 339 under Near Eastern Studies Civilization.

NES 343 Letter, Novel, Dictionary: The Making of National Language (also COM L 345 and JWST 345)] @
Fall. 4 credits. Enrollment limited to 25 students. I. Tucker.
This course will trace the emergence of the concept of national language in Europe in the eighteenth and nineteenth centuries, attempting to discover what exactly was at stake in the establishment of language as the paradigmatic form of national culture. Using the "case" of the Hebrew language as the organizing principle of the first part of the course, we will examine a variety of theories of linguistic origin in order to understand the relationships between models of linguistic and political authority. We will then turn to the novel as a genre centrally concerned with the paradoxical construction of "written speech," tracing the movement from the epistolary novel's formal attempt to make written language behave like speech, to the decline of the novel as a genre in medieval Hebrew. In this light, the course will return to the theoretically and historically revealing case of Hebrew, focusing in particular on the late nineteenth-century rise of the Hebrew novel, texts composed in a language without a vernacular out of fragments of existing religious writings. We will also examine the epistemological, pedagogical, political, and formal presumptions underlying a variety of efforts to institutionalize national language, including the Academie Francaise and national dictionaries like Samuel Johnson's and the OED. (All readings will be in English.)

NES 352 From Sufi Poet to Muslim Saint: Sufism, Sanctioning, and Shrine Building in Egypt and Anatolia (also ART HIST 391) @
Fall. 4 credits. S. Wolper.
This course examines how and why a cult of Sufi saints became such a significant part of religious practice in medieval Islamic Egypt and Anatolia. During this period Sufi saints were created and legitimized by a second generation who collected the work of Sufi poets together with the accounts of their miraculous works. The course will focus on the reception of works by Ibn al-Farid and Jalal al-Din Rumi in order to address the sanctification of these figures. As part of this inquiry, students will examine the relationship between the work of Sufi poetry and the endowment of shrines.

NES 400 Seminar in Advanced Hebrew (also JWST 400)] @
Spring. 4 credits. Enrollment limited to 15 students.
Prerequisite: NES 302/JWST 302 or permission of instructor.

[NES 402 Seminar in Hebrew Literature and Poetics (also Jewish Studies 402)] @
Spring. 4 credits. Prerequisites: NES 301 or equivalent and permission of instructor.

NES 420 Readings in Biblical Hebrew Prose (also JWST 420 and RELST 420)] @
Fall. 4 credits. G. Rendsburg.
For description, see NES 420 under Near Eastern Language.

NES 421 Readings in Biblical Hebrew Poetry (also JWST 421 and RELST 421)] @
Spring. 3 credits. Prerequisite for NES 421: one year of Biblical or Modern Hebrew. Course may be repeated for credit. G. Rendsburg.

Advanced course in reading selected poems of the Hebrew Bible. Chapters to be studied include various Psalms, parts of the Book of Job, various prophetic speeches, and early compositions such as Genesis 49 and Judges 5. Emphasis will be placed on the philological method, with attention to literary, historical, and comparative concerns as well.

[NES 428 Medieval Hebrew Biblical Exegesis (also JWST 428, NES 624, and RELST 428)] @
Fall. 4 credits. Prerequisite: permission of instructor. Enrollment limited to 20 students.
This seminar is devoted to comparative and critical readings of some of the most significant texts of the medieval Hebrew biblical exegetical tradition. We will discuss the history of that tradition, differing notions of epistemological status, and the ways that arise from the texts, and the way in which exegetical strategies served as the basis for the internal transformation of a text-centered religious tradition.

NES 429 Readings in the New Testament (also English 429, COM L 429 and Religious Studies 429) @
For description, see COM L 429.

[NES 432 Readings in Judeo-Arabic: Medieval Judeo-Arabic and Hebrew Poetics (also Jewish Studies 482)] @
Spring. 4 credits. Prerequisite: Arabic 212, Hebrew 202, or equivalents. Designed for graduate students but open to undergraduates with permission of instructor. Entire sequence may be repeated for credit; readings will vary from year to year. Not offered 1995–96. R. Brann.

NES 440 The Form of the Jews (also COM L 480 and JWST 440) @
Spring. 4 credits. Enrollment limited to 25 students. I. Tucker.
The course will examine the intersections of generic innovation and the category of Jewishness in marking and producing changes in the concept of the modern subject. Moving from the emergence of a formal political identity of English liberalism through the nineteenth-century creation of the national subject to the "deformations" of modernism and post-structuralism, we will explore the political, social, and literary histories of the concept of form, and ask why it is that these histories seem so consistently to trace a discursive history of Jewishness as well. The second part of the course, "Forming the Group," combines an examination of novelistic challenges to liberalism with an exploration of a variety of nineteenth-century efforts to formalize group identity: Marxism, nationalism, social science. In part III, we will examine the movement to formalize group identity in the context of the Holocaust, asking what it would mean to see the historical event of genocide in relation to (and perhaps caused by) a history of form. We will end by looking at a number of post-structuralist explorations of these issues.

NES 620 Readings in Medieval Hebrew Poetry and Prose (also JWST 620)
Fall and spring. 4 credits each semester.
Prerequisite: permission of instructor. R. Brann.
Critical readings in medieval Hebrew lyrical and liturgical poetry and imaginative rhymer prose from tenth-century Muslim Spain to Renaissance and Baroque Italy. Course may be repeated for credit.

NES 624 Medieval Hebrew Biblical Exegesis (also JWST 428, and RELST 428)
Fall. 4 credits. Prerequisite: permission of instructor. Enrollment limited to 10 students. Not offered 1995–96. R. Brann.

NES 627 The Song of Songs (also Religious Studies 627 and Jewish Studies 627) @

NES 628 Genesis (also NES 228 and Jewish Studies 628)

NES 633-634 Elementary Akkadian I and II (also Near Eastern Studies 333-334)
Fall, 633; spring, 634. 4 credits.
Prerequisites: NES 212, Hebrew 202, or equivalents. Designed for graduate students but open to undergraduates with permission of instructor. Entire sequence may be repeated for credit; readings will vary from year to year. Not offered 1995–96. D. Owen.
The Program of Jewish Studies

The Program of Jewish Studies encompasses a broad spectrum of disciplines that includes civilization, history, language, literature, philosophy, and religion. The program 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 with the director, Professor David A. Owen, 360 Rockefeller Hall. For complete listings and descriptions, see Program of Studies and Descriptions, see Program of Jewish Studies listing and descriptions, see Program of Studies and Descriptions.

Nes 639 Muslims, Christians and Jews in Islamic Spain: Literature and Society (also COM L 639 and SPANL 699)
Spring. 4 credits. R. Branin.
For description, see Nes 639 under Near Eastern Civilization.

Nes 499 Independent Study, Honors
Fall and spring. Variable credit. Prerequisite: permission of instructor. Staff.

[NEs 635–636] Readings in Akkadian Texts (also NEs 335–336)

Nes 656 Readings in Classical Arabic
Fall. 4 credits. Prerequisite: NEs 311 or permission of instructor. D. Powers.
Selected readings in classical Arabic.

Nes 491–492 Independent Study, Undergraduate Level
Fall and/or spring. Variable credit. Prerequisite: permission of instructor.

Nes 691–692 Independent Study, Graduate Level
Fall or spring. Variable credit. Prerequisite: permission of instructor.

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[NEs 478] Jewish-American Writing (also English 488)

Jwst 491–492 Independent Study: Undergraduate
Fall or spring. Variable credit. Prerequisite: permission of instructor.

Jwst 499 Independent Study: Honors
Fall and spring. Variable credit. Prerequisite: permission of instructor.

Related Courses in Other Departments

African Studies
Archaeology
Classics
Comparative Literature
Economics
English
German Studies
Government
English
History
History of Art
Medieval Studies
Modern Languages and Linguistics
Philosophy
Religious Studies
Romance Studies
Russian Literature
Society for the Humanities
Sociology
Women's Studies

NEPALI
See Department of Modern Languages and Linguistics.

PHILOSOPHY


The study of philosophy provides students with an opportunity to become familiar with some of the ideas and texts in the history of thought while developing analytical skills that are valuable in practical as well as academic affairs. It affords the excitement and satisfaction that come from understanding and working toward solutions of intellectual problems. The curriculum includes offerings in the history of philosophy, logic, philosophy of science, ethics, social and political philosophy, metaphysics, and theory of knowledge. Any philosophy course numbered in the 100s or 200s is suitable for beginning study in the field. Sections of Philosophy 100 are part of the freshman writing seminar program; they are taught by various members of the staff on a variety of philosophical topics, and because of their small size (seventeen students at most) they provide ample opportunity for discussion. Students who want a broad introduction to philosophy may take Philosophy 101, but many students with special interests may find that the best introduction to philosophy is a 200-level course in some particular area of philosophy; such courses have no prerequisites and are usually open to freshmen.

The Major

Students expecting to major in philosophy should begin their study of it in their freshman or sophomore year. Admission to the major is granted by the director of undergraduate studies of the department on the basis of a student's work during the first two years. Normally the student must have completed two philosophy courses with grades of B or better. Eight philosophy courses are required for the major. They must include at least one course in some particular area of classical modern metaphysics and epistemology (Philosophy 312 or a course on the empiricists, the rationalists, or Kant), and a minimum of three courses numbered above 300. A course in formal logic (e.g., Philosophy 231), while not required, is especially recommended for majors or prospective majors.

Philosophy majors must also complete at least 8 credits of course work in related subjects approved by their major advisers. Occasionally majors may serve as teaching or research aides, working with faculty members familiar with their work.

HONORS

A candidate for honors in philosophy must be a philosophy major with an average of B- or better for all work in the College of Arts and Sciences and an average of B+ or better for all work in philosophy. In either or both terms of the senior year a candidate for honors enrolls in Philosophy 490 and undertakes research leading to the writing of an honors essay by the end of the final term. Honors students normally need to take Philosophy 490 both terms of their senior year in order to write an satisfactory honors essay. Philosophy 490 does not count toward the eight philosophy courses required for the major. Prospective candidates should apply at the philosophy department office, 218 Goldwin Smith Hall.

Fees

In some courses there may be a small fee for photocopying materials to be handed out to students.

Introductory Courses

These courses have no prerequisites; all are open to freshmen.

Note: Class meeting times are accurate at the time of publication. If changes are necessary, the department will provide new information as soon as possible.

PMIL 100 Freshman Writing Seminars in Philosophy
Fall and spring. 3 credits. Consult the brochure listing freshman writing seminars prepared by the John S. Knight Writing Program.

PHIL 101 Introduction to Philosophy (by petition for breadth requirement)
This course will deal with a number of the central problems of philosophy, such as the existence of God, our knowledge of the external world, the mind-body problem, free will and the foundations of morality.
PHIL 131 Logic, Evidence, and Argument
Fall. 3 credits. M W F 11:15-12:05. S. MacDonald.
This course examines the nature and structure of argument with the aim of developing formal methods for analyzing and evaluating the sorts of reasoning we encounter and use in everyday discourse.

PHIL 145 Contemporary Moral Issues
Fall. 3 credits. M W F 2:30-3:20. R. Miller.
An examination of central moral issues is American politics today. At what point, if any, is abortion wrong, and in what circumstances should it be legal? What should be done to reduce economic, racial and sexual inequalities? For example, is there a moral justification for affirmative action programs? For social welfare programs? What are the limits of the right to free speech? Do they protect pornography? racist speech? When is it right to go to war? What obligations do U.S. citizens have to immigrants? to people in poor countries? We will analyze the answers and arguments of major philosophers, political leaders and judges, through both lectures and discussion sections.

PHIL 201 Philosophical Problems
Fall. 4 credits. M W F 10:10-11:00. C. Ginet.
This course will discuss the following well-known puzzles: Zeno's paradoxes of motion (the Racecourse, the Arrow, the Stadium) and of plurality, the paradox of the heap, the paradox of the surprise examination, the prisoner's dilemma. Newcomb's problem, and the trolley problem. The puzzles present us with reasoning that is paradoxical in the sense that, although it seems clear that there must be something wrong with the reasoning, it is not easy to see what it is. Studying such puzzles is not only an intriguing exercise in itself but can show us interesting things about such basic concepts as those of space, time, motion, truth, knowledge, rational choice, and causation.

PHIL 211 Ancient Philosophy
Fall. 4 credits. No prerequisites. T R 1:25-2:40. G. Fine.
This course explores the origins of Western philosophy, as it emerged in Ancient Greece and Rome. We will explore some of the central ideas of the presocratics, Socrates, Plato, Aristotle, and the post-Aristotelians (Epicureans, Stoics, and Sceptics). Questions to be considered: What are the nature and limits of knowledge? How reliable is perception? What are the basic entities in the universe-atoms? Plato's Forms? Aristotle's substances? Is moral knowledge possible? Why be moral? What is the nature of happiness and what sort of life will make people happy? Do human beings have free will? This course has no prerequisites.

PHIL 212 Modern Philosophy
Spring. 4 credits. T R 11:40-12:55. Z. Szabo.
A survey of European philosophy in the 17th and 18th centuries focusing on the development of concepts about the foundations of knowledge and the limits of understanding. The course will concentrate on major works by Descartes, Spinoza, Locke, Berkeley, Leibniz, Hume, and Kant.

PHIL 213 Existentialism (also Comparative Literature 213)
Fall. 4 credits. T R 11:40-12:55. A. Wood.
An introductory study of selected writings of four major thinkers in the existentialist tradition: Nietzsche, Dostoevsky, Heidegger, Sartre. Readings will include a variety of literary forms (apophthegms, prose-poetry, novels) as well as philosophical treatises.

PHIL 214 Philosophical Issues in Christian Thought
Fall. 4 credits. Not offered 1995-96.

PHIL 215 Introduction to Formal Logic
Fall and spring. 4 credits. Normally offered in the six-week summer session. Fall. M W F 11:15-12:05. J. Stanley. Spring. M W F 10:10-11:00. C. Ginet. Analysis and evaluation of deductive reasoning in terms of formalized languages. The logic of sentences, predicates, and quantifiers. (This course, rather than Philosophy 331, is the recommended introductory formal logic course.)

PHIL 241 Ethics (by petition for breadth requirement)
Spring. 4 credits. T R 2:55-4:10. R. Miller. Introduction to the philosophical study of moral major questions—for example: Are all values relative, or are there some objective moral values? Have we ever any good reason to care about the interests of other people? Do people have rights with which governments should not interfere, even to advance the general welfare? What inequalities are unjust? The course discusses general issues in moral philosophy, together with some of their implications for particular current moral controversies, such as the debates over abortion, reverse discrimination, and policies reducing economic inequality. Readings from major philosophers of the past, as well as contemporary sources.

PHIL 242 Social and Political Theory (by petition for breadth requirement) (also Government 260)

PHIL 243 Aesthetics
Fall. 4 credits. Not offered 1995-96.

PHIL 244 Philosophy and Literature

PHIL 245 Ethics and Health Care
4 credits. Not offered 1995-96. Normally offered also in the six-week summer session.

PHIL 246 Ethics and the Environment
Spring. 4 credits. Open to all undergraduates. Permission of instructor required for graduate students. M W F 11:15-12:05. N. Sturgeon.
Critical philosophical analysis of the conceptual frameworks in which policies affecting the environment are formulated and judged. Topics include the nature of ethics and the possibility of knowledge in ethics; the nature and extent of individual and social obligation to distant people, future generations, nonhuman animals and nonsentient things (e.g., the ecosystem); the origin of environmental problems and the range of options for their solution.

PHIL 247 Ethics and Public Life
Spring. 4 credits. Not offered 1995-96.

PHIL 251 Knowledge and Reality

PHIL 252 Philosophy of Mind

PHIL 253 Religion and Reason
Spring. 4 credits. T R 1:25-2:40. S. MacDonald.
We will develop the classical conception (shared by several world religions) of God as an absolutely perfect being (APB) and try to answer such questions as: What is the nature of the APB? Is it possible for anything to possess the attributes traditionally ascribed to the APB? Is the existence of an APB compatible with what we know about the world. We will also consider such issues as the relation of religion to morality and the status and justification of religious claims.

PHIL 254 Global Thinking (also Government 254)
Fall. 4 credits. T R 1:25-2:40, plus disc. H. Shue.
The analysis taught in this course is global in two different respects: international subjects and interdisciplinary methods. We look in detail at two of the most important and most difficult issues facing international society, devoting approximately half the course to each case: (1) when, if ever, should other nations intervene militarily into ethnic conflict like that in Bosnia? and (2) what, if anything, should industrialized nations and industrializing nations respectively do to reduce the emissions that promote climate change? On military intervention, we bring together political science, law, and ethics; on climate change, we bring together atmospheric chemistry, economics, and ethics. The course is team-taught by five leading faculty researchers from the fields listed.

Intermediate or Advanced Courses
Some of these courses have prerequisites.

PHIL 309 Plato
Fall. 4 credits. Prerequisites: at least one previous course in philosophy at the 200 level or above, or permission of the instructor. M W 2:55-4:10. G. Fine.
In this course, we will study many of Plato's major dialogues, beginning with the early Socratic dialogues, and continuing on with the middle dialogues (such as the Republic) and late dialogues (such as the Parmenides and Theaetetus). The focus of the course will be on metaphysics and epistemology, but some attention will also be paid to ethical theory, especially in the Republic.

PHIL 310 Aristotle

PHIL 311 Modern Rationalism
between the early modern debates and infinity. We will try to draw connections between decision and self-conception, abstraction, primary perceptual acquaintance, and self-knowledge. If we are to understand what reasons a reasons explanation is, we need to consider what it means to say that a reason is a reason, and how we can use this to understand the nature of reasons. In order to address the connection between the self and the emotions, we will examine self-knowledge, paying special attention not only to the relation of a reason to a reason (e.g., the Buddhist dissolution of self) but also to the self-knowledge of the self (e.g., autism, multipersonal identity, autognosis). Philosophical readings from ancient and modern sources (including Charles Taylor, Iris Murdoch, Ian Hacking, and Susan Bordo) will be supplemented by readings from other fields, including anthropology and psychology (e.g., from Clifford Geertz, Richard Shwedler, Daniel Stern, and Louis Sass).

**PHIL 461 Topics in Social and Political Philosophy (also Society for Humanities 421)**
Topic: Content and Context. In this course, we will examine the role of context in both philosophical and formal semantical accounts of the context of assertions and mental states. In addition, we will explore broader linguistic and philosophical consequences of the ubiquity of context-dependency.

**PHIL 462 Metaphysics**

**PHIL 463 Philosophy of Language**

**PHIL 464 Philosophy of Mind**

**PHIL 465 Philosophy of Religion**

**PHIL 466 Ethics and Value Theory (also Society for Humanities 404)**
Fall. 4 credits. Limited to 17 students. T 12:20-2:15. J. Jones.
Topic: History of Philosophy.

**PHIL 467 History of Philosophy #**

**PHIL 468 Philosophy of Science**
Spring. 4 credits. T 4:30-6:30 p.m. J. Stanley.
Topic: Content and Context. In this course, we will examine the role of context in both philosophical and formal semantical accounts of the context of assertions and mental states. In addition, we will explore broader linguistic and philosophical consequences of the ubiquity of context-dependency.

**PHIL 469 Topics in Political Philosophy (also Society for Humanities 421)**
Topic: Content and Context. In this course, we will examine the role of context in both philosophical and formal semantical accounts of the context of assertions and mental states. In addition, we will explore broader linguistic and philosophical consequences of the ubiquity of context-dependency.
positional courses sequence—(a) the two-course sequence in sequence (Physics 112-213-214 or Physics In addition to the three-term introductory program are worked out in consultation with the student and major faculty adviser. Details of the major course scheduling is reduced. The Major The major program is constructed to accommodate students who wish to prepare for professional or graduate work in physics as well as those who wish to complete their major program in the field of physics but have other professional or graduate aspirations. Students who wish to major in physics are advised to start the physics sequence in the first term of their freshman year. (Note that students who have had contact with introductory calculus may take Physics 112 with co-registration in Mathematics 191.) The major program can still be completed with a second-term start but flexibility in future course scheduling is reduced. Prospective majors are urged to make an early appointment at the physics office for advice in program planning. Acceptance into the major program is normally granted upon completion of a year of physics and mathematics courses at Cornell with all course grades at the B-level or higher. The department office will give advice in the matter of selecting a major faculty adviser. Details of the major course program are worked out in consultation between the student and major adviser. Physics Core Common to all major programs is a requirement to complete a core of physics courses. In addition to the three-term introductory sequence (Physics 112-213-214 or Physics 116-217-218), the core includes five upper-level courses—(a) the two-course sequence in modern physics (Physics 316–317), (b) at least three semester hours of laboratory work selected from Physics 310, 330, 360, 410, Astronomy 410, (c) an intermediate course in classical mechanics, and (d) an intermediate course in electromagnetism. Accompanying these physics courses should be work in one of the major courses in mathematics through at least Mathematics 294 or 222. Students following the professional/graduate school channel are expected to complete at least one additional year of applicable mathematics (Applied and Engineering Physics 321–322 or Mathematics 420/421–422). In addition to the core, each physics major must complete 15 semester hours of credit in an area of concentration which has been agreed upon by the student and major faculty adviser. Concentration within Physics A student who wishes to pursue professional or graduate work in physics or a closely related field should follow a concentration within the field of physics. For those students with a strong secondary school preparation, the sequence Physics 116–217–218 is encouraged. Core courses in mechanics and electromagnetism will normally be Physics 318 and Physics 327, respectively. The minimum 15 hours beyond the core must be composed of physics courses with numbers greater than 300 and must include the senior laboratory course Physics 410. This means a physics concentration needs a minimum of 7 hours of laboratory work to complete the requirements. The accompanying table shows several typical course sequences by means of which the major requirements may be completed. The primary distinction among students who may follow the different sequences is the amount and level of pre-college work in calculus and in physics. Changes in these typical patterns will be common, as agreed upon between student and major faculty adviser. Concentration outside Physics The concentration will reflect the student’s interest in some area related to physics. The array of courses that comprise the concentration must have internal coherence. The array will normally be worked out in conference with the major faculty adviser and must be approved by the adviser. Students must have mastered. Students who declare a concentration in physics, there will be a wide variation in the courses met with Physics 314, and Physics 323 respectively. Students with an astronomy concentration who might continue in that field in graduate school should use Astronomy 410, 431, 432 as part of the concentration; they should use Physics 318 and 327 to satisfy the core requirements in mechanics and electromagnetism.

Foreign Language Requirement Students interested in eventual graduate work in physics are advised to meet this College of Arts and Sciences requirement with work in French, German, or Russian.

Honors A student may be granted honors in physics upon the recommendation of the Physics Advisers Committee of the physics faculty. There is no particular course structure or thesis requirement for honors.

Double Majors Double majors including physics are possible and not at all uncommon. It should be noted, however, that if a student wishes to complete a major in physics as well as a major in one or more other subjects, any course used to satisfy a requirement of the second major may not be used also in satisfaction of any physics major requirement.

Courses with Overlapping Content Because the department offers several courses with overlapping content, students should select courses carefully to meet the needs of their academic programs and to ensure credit for each course they take. Listed below are groups of courses with largely similar content. In general, students may receive credit for only one of the courses in each group.

Physics 101, 207 Physics 102, 208 Physics 112, 116 Physics 213, 217 Physics 214, 216 Course Prerequisites Prerequisites are specified in physics course descriptions to illustrate the materials that students should have mastered. Students who wish to plan programs different from those suggested by the prerequisite ordering are urged to discuss their preparation and background with a physics adviser or with the instructor in the course. In many cases an appropriate individual program can be worked out without exact adherence to the stated prerequisites.

- For majors with concentrations outside physics, there will be a wide variation in individual programs, arranged to best match the field of concentration.
- Crossovers between the two sequences 112–213–214 and 116–217–218 are possible, although the combination 112–213–218 is difficult. Physics 207 may be substituted for Physics 112. Students taking 217 after 112 should coregister for 216.
- Exceptionally well-prepared students may be able to begin work at Cornell with Physics 217. Such students should come to the department office for advice in planning a course program.
Courses
Listed days and times are not definite but are unlikely to change. Days and times will not be listed for 600-level courses.

PHYS 103 General Physics
Summer. 4 credits. Prerequisite: Three years of high school mathematics, including some trigonometry. Primarily for students majoring in the life sciences.
Lectures and discussions: M-F 10:00–11:15; laboratories M W 2:00–5:00.
Basic principles treated quantitatively but without calculus. Kinematics, forces and fields, momentum, angular momentum and energy; thermal physics and fluid mechanics; and sound waves. Text at the level of Physics, 3rd edition, by Cutnell and Johnson.

PHYS 112 Physics I: Mechanics
Fall, spring. summer 6-week 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 111. Lec. M W F 10:10–11:00 or 12:20–1:10. One rec. and one lab each week. Evening exams. Fall, A. LeClair; spring, J. Parpia.

Typical Physics Course Sequences

<table>
<thead>
<tr>
<th>Semester</th>
<th>No AP math or physics</th>
<th>1 year AP calculus and good HS physics</th>
<th>Outside concentrators</th>
<th>Outside concentrators (alternate)</th>
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</thead>
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<tr>
<td>1st – Fall</td>
<td>112</td>
<td>116</td>
<td>112</td>
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<td>2nd – Spring</td>
<td>213</td>
<td>217</td>
<td>213</td>
<td>213</td>
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<td>3rd – Fall</td>
<td>214</td>
<td>218</td>
<td>214</td>
<td>213</td>
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<tr>
<td>4th – Spring</td>
<td>316, 310 or 360</td>
<td>316, 318</td>
<td>310 or 360</td>
<td>314</td>
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<tr>
<td>5th – Fall</td>
<td>317, 327</td>
<td>317, 327</td>
<td>316</td>
<td>330, 316</td>
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<tr>
<td>6th – Spring</td>
<td>318, 443</td>
<td>360, 443</td>
<td>314</td>
<td>314</td>
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<tr>
<td>7th – Fall</td>
<td>341, 410</td>
<td>350, 341, 410</td>
<td>317, 323</td>
<td>317, 323</td>
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<tr>
<td>8th – Spring</td>
<td>Elective(s)</td>
<td>Elective(s)</td>
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</table>

• For majors with concentrations outside physics, there will be wide variation in individual programs, arranged to best match the field of concentration.
• Crossovers between the two sequences 112–113–214 and 116–217–218 are possible, although the combination 112–213–218 is difficult. Physics 207 may be substituted for Physics 112. Students taking 217 after 112 must coregister for 216.
• Exceptionally well-prepared students may be able to begin work at Cornell with Physics 217. Such students should come to the department office for advice in planning a course program.
• Physics electives include 360, 444, 454, 455, 525, 553, 561, 572, the senior seminars 481–483, Astronomy 332 or 431–432, and A&EP 434, 436.

A more rigorous version of Physics 112, covering similar topics at the level of An Introduction to Mechanics, by Kleppner and Kolenkow.

PHYS 190 Supplemental Introductory Laboratory
Fall, spring. 1 credit. Times by arrangement with instructor. S-U only. (first offered spring 1996) Enrollment limited to students who have all of the following: (i) three transfer credits for introductory physics lecture material; (ii) a degree requirement of the laboratory component of that introductory course; (iii) approval of the director of undergraduate studies; (iv) permission of the lecturer of that course at Cornell. Enrollment limited. A Physics 190 Permission Form must be filed in 121 Clark Hall with the physics department course coordinator. Student perform the laboratory component of one of the introductory courses (Physics 112, 213, 214) to complement the lecture-related course credit acquired elsewhere. Those wishing to take the equivalent of one of these introductory courses at another institution should receive prior approval from the director of undergraduate studies.

PHYS 200 Art, Archaeology, and Analysis (also Engineering 185, M&S&E 285, Archaeology 285, English 285, and Art 372)
For description, see M&S&E 285.

PHYS 201 Why the Sky Is Blue: Aspects of the Physical World
This is a descriptive physics course aimed specifically at the non-science student. There is an emphasis on the ideas of modern physics where the approach is both historical and thematic. The methodology of science and the nature of evidence is emphasized. An overriding theme is the character of physical laws as shown through the great principles of symmetry and conservation. While there are a few computational problems assigned, the purpose is to help students to understand the concepts rather than to master problem-solving techniques.

PHYS 202 The World According to Physics—The Way Things Work
Summer-3 week session. 3 credits. Prerequisite: three years of high school mathematics, including some trigonometry. M-F 10:00–12:00; laboratories 2 afternoons per week to be arranged. R. Lieberman.
Intended to provide students majoring in fields outside the sciences with an appreciation for the familiar physical world surrounding them. Which falls faster, a pound of gold or a pound of feathers? What trajectory does a launched rocket follow? Why are the curves on highways banked? What actually keeps a satellite circling the earth—why doesn’t it just fall down or fly away? Can you build a ship that runs off the heat found in the ocean? With an emphasis on problem solving, the course helps the student to develop skills transferable to other areas. Topics include Newton’s basic laws of motion, trajectories, satellites, space travel, and the concepts of energy.
PHYS 204 Physics of Musical Sound
Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but will use high school algebra. Lec. M W F 2:30-3:20, five one-hour labs to be arranged, rec. T 2:30-3:20.

An attempt to explain how and when natural scientists might rationally arrive at these conclusions. The first part of the course deals in a constructive way with the basic ideas of probability theory and explains why it is that in large systems apparently random events can become overwhelmingly likely. An introduction to quantum mechanics and to heat as probabilistic mechanics follows. In this way, interested students are given a nontrivial understanding of the second law of thermodynamics, that putative bridge between C. P. Snow's two cultures. Another physical theory, quantum mechanics, in which chance occurs—though in a somewhat mysterious way—is touched on. Approximately five self-paced laboratory experiments will be included.

PHYS 205 Reasoning about Luck
Fall. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but will use high school algebra. Lec. M W F 2:30-3:20; five one-hour labs to be arranged, rec. T 2:30-3:20.

This course is intended for any student who wishes to understand the following: the history and evolution of military strategy; the history and evolution of scientific background and will use high school algebra. Lec. M W F 2:30-3:20; five one-hour labs to be arranged, rec. T 2:30-3:20.

PHYS 206 War and Peace in the Nuclear Age (also Government 384)
Spring. 4 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but will use high school algebra. Lec. T 10:10-11:25.

This course is intended for any student who wishes to understand the following: the history and evolution of military strategy; the developments in 20th-century physics that culminated in the development of the "atomic" bomb; the principles, types, and effects of nuclear weapons; existing and proposed arms and delivery systems; the evolution of the nuclear military strategy of the nuclear powers; and the history of nuclear arms-control negotiations. The course will also examine important concepts involved in military strategy and arms control. Much attention will be given to the problem and mechanisms of control of proliferation and weapons of mass destruction. Assignments emphasize quantitative reasoning skills as well as the technical subject matter.

PHYS 207-208 Fundamentals of Physics
207, fall; 208, spring. 4 credits each term. Prerequisites for Physics 207: high school physics plus Mathematics 111 or 191, or substantial previous contact with introductory calculus, combined with coregistration in a math course approved by instructor.

PHYS 209 Relativity and Chaos
Fall. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes a scientific background but will use high school algebra. Lec. M W F 2:30-3:20; five one-hour labs to be arranged, rec. T 2:30-3:20.

We will examine two revolutionary fields of classical physics that are relatively recent: the special theory of relativity will be developed, with a view to understanding how certain simple but apparently contradictory facts about light lead to extraordinary insights into the nature of time; and the newer subject of "chaos" will be explored, with a view to seeing how extremely simple rules can lead to behavior of breathtaking complexity.

PHYS 210 Randomness in Classical and Quantum Physics
Spring. 3 credits. Intended for nonscientists; does not serve as a prerequisite for further science courses. Assumes no scientific background but will use high school algebra. Lec. M W F 2:30-3:20; five one-hour labs to be arranged, rec. T 2:30-3:20.

We will examine two areas of physics where randomness plays a central role: the classical probability theory of gamblers, and its relation to subjects from the nature of coincidence to the direction of the flow of time; and the quantum theory, which promotes randomness from a consequence of human ignorance to a fundamental aspect of the physical world, leading to Einstein's celebrated rejection of a dice-throwing God and his more disturbing complaint about "spooky actions at a distance."

PHYS 213 Physics II: Electricity and Magnetism
Fall, spring, (summer, 6 week session). 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: Physics 212 and coregistration in the continuation of the mathematics sequence required for Physics 112. Lec. T 9:05-9:55 or 11:15-12:05, two rec. each week and one 3-hour lab alternate each week. Evening exams. Fall, R. Pohl; spring, R. Galik.

Electrostatics, behavior of matter in electric fields, DC and AC circuits, magnetic fields, Faraday's law, magnetic phenomena, electromagnetic oscillations and waves. At the level of Physics for Scientists and Engineers. Vol. 2, by Tipler. Laboratory covers electrical measurements, DC and AC circuits.

PHYS 214 Physics III: Optics, Waves, and Particles
Fall, spring, (summer, 6 week session). 4 credits. Primarily for students of engineering and for prospective physics majors. Prerequisites: Physics 213 and coregistration in the continuation of the mathematics sequence. Lec. T R 9:05-9:55 or 11:15-12:05. Two rec. each week and one 3-hour lab alternate each week evening exams. Fall, J. Brock; spring, P. Drnell.

Physics of wave phenomena, electromagnetic waves, interference and diffraction effects, wave properties of particles and introduction to quantum physics. A written report is due in solving laboratory problems. At the level of Physics for Scientists and Engineers, by Tipler.

PHYS 216 Introduction to Special Relativity
Fall, spring. Based upon prerequisite. 1 credit. S-U only. Enrollment may be limited. Intended for students who have done very well in Physics 207 or 216 and in mathematics and who desire a more analytic treatment than that of Physics 213. Prospective physics majors are encouraged to select Physics 217. Prerequisites: approval of student's adviser and permission from the instructor. A placement quiz may be given early in the semester, permitting those students who find Physics 217 too abstract or analytical to transfer into Physics 213, which they can do without difficulty at that time. Vector calculus will be taught in this course, but previous contact, especially with the operations grad, div, and curl, is helpful. It is assumed that the student has seen Special Relativity at the level of Physics 116 or is currently enrolled in Physics 216. It is also assumed that the student has covered the material of Mathematics 192 and is coregistered in Mathematics 293 or the equivalent. Lec. M W F 10:10-11:00. Fall, B. Gittelman; spring, K. Berkelman. At the level of Electricity and Magnetism, by Purcell (Vol. 2, Berkeley Physics Series).

PHYS 218 Physics III: Waves and Thermodynamics
Fall, winter. 4 credits. Enrollment may be limited. A special section of Physics 218. Conditions governing enrollment are similar to those of Physics 217. Lec. M W F 11:15-12:05. Fall, J. Brock; spring, D. Cassell.
Topics covered in recent years have included oscillators, mechanical waves, waves at interfaces, standing waves, electromagnetic waves, guided waves, scattering, interference and diffraction, geometric optics, the doppler effect, and an introduction to matter waves. Evening exams may be scheduled. A more rigorous version of Physics 214.

**PHYS 310 Intermediate Experimental Physics**
Spring. 3 credits. Enrollment may be limited. Prerequisite: Physics 208 or 213. Labs T 4:30-5:25. Students select from a variety of experiments. An individual, independent approach is encouraged. Facilities of the Physics 410 lab are available for some experiments.

**PHYS 314 Intermediate Mechanics**
Spring. 4 credits. Prerequisites: Physics 208 or 214 (or equivalent) and Math 294 (or equivalent); Applied and Engineering Physics 322 or coregistration in Mathematics 420/421 recommended. Intended for physics majors with concentration outside of physics or astronomy; Physics 318 covers similar material at a more analytical level. Lec. MWF 10:10–11:00, rec. F 1:25–2:15.
Includes Newtonian mechanics, Lagrange and Hamilton formulations, central forces, rigid body motion, and small oscillations. At the level of Classical Dynamics by Marion and Thornton.

**PHYS 316-317 Modern Physics I and II**
3 credits each term. Physics 316, fall, spring; Physics 317, fall. The two courses comprise a two-semester sequence and it is assumed that a student registering in Physics 316 will continue with Physics 317. Prerequisites: Physics 316; Physics 214 or 218, and coregistration in at least Mathematics 294 or equivalent; Physics 317: Physics 316. Lec. MWF 9:05–9:55, rec. T 12:30–3:20; Fall, 316; R. Patterson, 317. N. W. Ashcroft, spring, staff.
Introduction to the physics of microscopic phenomena, emphasizing the use of elementary quantum and statistical mechanics. At the level of Price's Atomic, Molecules, Solids, Nuclei, and Particles by Eisberg and Resnick. Physics 316: Breakdown of classical concepts in microphysics; light quanta and matter waves; Schrödinger equation and solutions in 1 and 3 dimensions; hydrogen atom; exclusion principle, the periodic table. Physics 317: Classical and quantum statistical mechanics; molecules, solid state physics; nuclear physics and radioactivity; elementary particle physics.

**PHYS 318 Analytical Mechanics**
Spring. 4 credits. Prerequisites: Physics 116 and permission of instructor; Applied and Engineering Physics 321 or Mathematics 420/421. Intended for junior physics majors concentrating in physics or astronomy. Sophomores should have permission of the instructor before registering. Physics 318 covers similar material at a less demanding level. Lec. M 10:10–11:00, Labs W or R 1:25–3:20, rec. F 2:30–3:20. L. Hand.
Newtonian mechanics of particles and systems of particles, including rigid bodies; oscillating systems; gravitation and planetary motion; moving coordinate systems; Euler's equations; Lagrange and Hamilton formulations; normal modes; introduction to chaos. At the level of Mechanics by Landau and Physics 318 Lecture Notes by Hand and Finch. Supplementary reading will be assigned.

**PHYS 323 Intermediate Electricity and Magnetism**
Fall. 4 credits. Prerequisites: Physics 208 or 214 (or equivalent) and Math 294 (or equivalent); coregistration in Applied and Engineering Physics 322 or Math 420/421 recommended. Intended for physics majors with concentration outside of physics or astronomy; Physics 327 covers similar material at a more analytical level. Lec. MWF 1:15–12:05, rec. F 2:30–3:20. G. F. Dugan.
Includes electro/magnetostatics, boundary value problems, dielectric and magnetic media, Maxwell's Equations, and electromagnetic waves, and an introduction to special relativity. At the level of Introduction to Electrodynamics, by Griffiths.

**PHYS 327 Advanced Electricity and Magnetism**
Fall. 4 credits. Prerequisites: Physics 217/218 or permission of instructor; coregistration in Applied and Engineering Physics 327 or Mathematics 420/421. Intended for physics majors concentrating in physics or astronomy. Physics 323 covers similar material at a less demanding level. N.B.: Physics 327 assumes knowledge of oscillations and waves at the level of Physics 217. Lec. MWF 11:15–12:05, rec. F 2:30–3:20. P. Lepage.
Electro/magneto-statics-vector and scalar potentials, Laplace's Equation and boundary value problems, solutions to Maxwell's Equations, energy-momentum of radiation; electrodynamics in media; special relativity-transformations, four vectors, particle kinematics and dynamics, relativistic electrodynamics. At the level of Introduction to Electrodynamics, by Griffiths.

**PHYS 330 Modern Experimental Optics**
(also A&EP 330)
A practical laboratory course in basic and modern optics. The seven projects cover a wide range of topics from geometrical optics to classical wave properties such as interference, diffraction and polarization. Each experimental setup is equipped with standard, off-the-shelf optics and opto-mechanical components to provide the students with hands-on experience in practical laboratory techniques currently employed in physics, chemistry, biology, and engineering. The students will also be introduced to digital imaging and image processing techniques.

**PHYS 341 Thermodynamics and Statistical Physics**
Statistical physics, developing both thermodynamics and statistical mechanics simultaneously. Concepts of temperature, laws of thermodynamics, entropy, thermodynamic relations, free energies 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 Thermral Physics, by Reif, or Thermal Physics, by Morse.

**PHYS 360 Electronic Circuits (also A&EP 363)**
Fall, spring. 4 credits. Prerequisites: Physics 208 or 213 or permission of the instructor. No previous experience with electronics assumed. The course moves quickly through some introductory topics such as basic DC circuits. Fall term is usually less crowded. Lec. M 2:30–4:25; labs, T R or W F 1:25–4:25 (also evening labs T W M 7:30–10:30 spring). Fall, E. Kirkland; spring, J. Alexander.
Analyze, design, build, and experimentally test circuits used in scientific and engineering instrumentation (with discrete components and integrated circuits). Analog circuits: resistors, capacitors, operational amplifiers (linear amplifiers with feedback, oscillators, comparators), filters, diodes and transistors. Digital circuits: combinatorial (gates) and sequential (Flip-flops) logic. Computer interfacing introduced and used to investigate digital to analog (DAC) and analog to digital conversion (ADC) and signal averaging.

**PHYS 400 Informal Advanced Laboratory**
Fall, spring; (summer, 6 week session). Variable to 3 credits. Prerequisites: two years of high school physics or permission of instructor. Lab T W 1:25–4:25. Fall, W. Ho; spring, D. Hartill.
Experiments of widely varying difficulty in one or more areas, as listed under Physics 410, may be done to fill the student's special requirements.

**PHYS 410 Advanced Experimental Physics**
Fall, spring. 4 credits. Limited to seniors except by special permission. Prerequisites: Physics 214 (or 310 or 360) plus 318 and 327, or permission of instructor. Lec. M 2:30–4:25, lab. T W 1:25–4:25. Fall, W. Ho; spring, D. Hartill.
Selected topics in experimental concepts and techniques. About seventy different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ionics, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, nuclear physics. The student performs three to six diverse experiments, depending on difficulty, selected to meet individual needs and interests. Independent work is stressed.

**PHYS 443 Introductory Quantum Mechanics**
Introduction to concepts and techniques of quantum mechanics, at the level of Introduction to Quantum Mechanics, by Dicke and Witte.

**PHYS 444 Nuclear and High-Energy Particle Physics**
Behavior of high-energy particles and radiation; elementary particles; basic properties of accelerators and detectors; general symmetries and conservation laws. At the level of Concepts of Particle Physics, by Gottfried and Wunnskoff.
PHYS 454 Introductory Solid-State Physics  
Fall. 4 credits. Prerequisite: Physics 443, A&EP 361, Chemistry 793, or permission of instructor. Lect. M W T 11:15-12:05. Computer lab W or R 1:30-2:30. R. Silsbee. An introduction to modern solid-state physics, including crystal structure, lattice vibrations, electron theory of metals and semiconductors, and selected topics from magnetic properties, optical properties, superconductivity, and defects. At the level of Introduction to Solid State Physics, by Kittel, and Solid State Physics, by Ashcroft and Mermin.

PHYS 455 Geometrical Concepts in Physics  
Spring. 3 credits. Prerequisite: Physics 327 and at least coregistration in Physics 318 or permission of instructor. Offered spring 1996. Usually offered every other year. Lect. T R 10:10-11:25. B. Greene. Geometric methods are an essential tool in modern theoretical physics and also provide deep insights into classical physics—electrodynamics, thermodynamics, mechanics, special and general relativity. This course will introduce basic concepts from topology and differential geometry, emphasize calculation methods and illustrate their utility by drawing examples from these areas of physics. In particular, we shall cover manifolds, differential forms, vector bundles, homotopy, homology and lie groups. At the level of Geometrical Methods of Mathematical Physics by Schutz.

PHYS 480 Computational Physics (also Phys 680 and Astro 690)  
Spring. 3 credits. S-U grades only. Prerequisites: The course assumes a good background in the standard "mathematical methods for physics," and the ability to write programs in Fortran or C. No previous knowledge of numerical analysis is assumed. Lect. T R 10:10-11:25. S. Teukolsky. A course designed to familiarize students with numerical techniques for solving diverse problems in physics and related fields. The problems will be drawn from many different branches of physics, and the emphasis will be on common techniques of solution. Numerical techniques discussed in the course will include ordinary and partial differential equations, linear algebra and eigenvalue problems, Monte Carlo techniques, solving nonlinear equations, fast Fourier transforms, etc. In contrast to traditional numerical analysis courses, the flavor of the course will be "how-to," rather than theoretical. No theorems will be proved. Students will be expected to solve, both individually and in small teams, assigned numerical exercises. Text: Numerical Recipes: The Art of Scientific Computing, by Press, Teukolsky, Flannery, and Vetterling.

PHYS 481-482 Special Topics Seminar  
Offerings are announced each term. 2 and 3 credits. Limited to senior physics majors and those who receive permission of instructor. S-U grades only.

PHYS 490 Independent Study in Physics  
Fall or spring. Variable to 4 credits. Ordinarily limited to seniors. Prerequisite: permission required of professor who will direct proposed work. A copy of Request for Independent Study form must be filed with physics department core coordination.

PHYS 495 General Relativity (also Astronomy 509-510)  
Spring. 3 credits. Prerequisite: an undergraduate course in classical mechanics at the level of books by K. Symon or J. B. Marion. Lect. T R 10:10-11:00. Rec. R 1:30-3:30. Lagrangian and Hamiltonian formulation of classical mechanics, with modern applications in nonlinear dynamics. Foundations will be taught at the level of Mechanics, by Scheck.

PHYS 500 Informal Graduate Laboratory  
Fall, spring; variable to 2 credits. By permission of instructor.

PHYS 510 Advanced Experimental Physics  
Fall, spring, summer. 3 credits. Lab. T W 1:25-4:25. Fall, W. Ho, spring, D. Hartill. About seventeen different experiments are available in acoustics, optics, spectroscopy, electrical circuits, electronics and ions, magnetic resonance, X-rays, low temperature, solid state, cosmic rays, nuclear physics. Students perform four to eight experiments selected to meet individual needs. Independent work is stressed. An optional lecture associated with Physics 410, M 2:30-4:25 is available. It includes lectures on techniques used in experiments in the advanced laboratory and on current research topics.

PHYS 520 Projects in Experimental Physics  
Fall, spring, summer. Variable to 3 credits. To be supervised by faculty member. Students must advise department course coordinator of faculty member responsible for their project. Prerequisite: Physics 510. Projects of modern topical interest that involve some independent development work by student. Opportunity for more initiative in experimental work than is possible in Physics 510.

PHYS 525 Physics of Black Holes, White Dwarfs, and Neutron Stars (also Astronomy 511)  

PHYS 551 Classical Mechanics  
Spring. 3 credits. Prerequisite: an undergraduate course in classical mechanics at the level of books by K. Symon or J. B. Marion. Lect. T R 10:10-11:00; Rec. R 2:30-3:20. Lagrangian and Hamiltonian formulation of classical mechanics, with modern applications in nonlinear dynamics. Foundations will be taught at the level of Mechanics, by Scheck.

PHYS 553 General Relativity  

Physics 553 is a systematic introduction to Einstein's theory, with emphasis on modern coordinate-free methods of computation. Topics include review of special relativity, modern differential geometry, foundations of general relativity, laws of physics in the presence of a gravitational field, experimental tests of gravitation theories. At the level of Gravitation, by Misner. Physics 554 is a continuation of 553 that emphasizes applications to astrophysics and cosmology. Topics include relativistic stars, gravitational collapse and black holes, gravitational waves, cosmology.

PHYS 561 Classical Electrodynamics  
Fall. 3 credits. Lect. T R 8:30-9:55, rec. M W F 1:25-2:40. V. Elser. Maxwell's equations, electromagnetic potentials, electrodynamics of continuous media (selected topics), special relativity, radiation theory. At the level of Classical Electrodynamics, by Jackson.

PHYS 562 Statistical Physics  
Spring. 4 credits. Primarily for graduate students. Prerequisites: a good knowledge of quantum mechanics (at the level of Merzbacher) and classical mechanics (at the level of Marion), and statistical mechanics (at the level of Reif). Lect. M W F 9:05-9:55. N. Ashcroft. Macroscopic or thermodynamic concepts including the laws of thermodynamics, thermodynamic functions, thermodynamic stability, and the thermodynamics of phase equilibria. Microscopic concepts including 1-, 2-, and N-particle quantum states; the microcanonical, canonical and grand canonical ensembles, Bose-Einstein, Fermi-Dirac and Boltzmann statistics; the density-matrix. The microscopic-macroscopic connection. Applications include spin systems—the hinged and related models, strongly correlated fluids, and lattice-gases, including distribution and correlation functions, thermodynamic perturbation theory and introduction to critical phenomena; dense Fermi- and Bose- systems; linear response: 4-quantum and classical systems; transport phenomena and the Boltzmann equation. At the level of Statistical Mechanics by Pathria or Statistical Mechanics by Huang, 2nd edition.

PHYS 572 Quantum Mechanics I  
Fall. 4 credits. Lect. M W F 11:15-12:05. K. Gottfried. General principles of quantum mechanics, formulated in the language of Dirac. Systems with few degrees of freedom: hydrogen, including fine and hyperfine structure; the deuteron and neutron-proton scattering; helium. Theory of symmetry, perturbations and collisions will be developed as needed to analyze phenomena displayed by these systems. At the level of Quantum Mechanics by Landau and Lifshitz. A knowledge of the subject at the level of 571 will be assumed, but the course will be self-contained.

PHYS 574 Quantum Mechanics II  
PHYS 635 Solid-State Physics I
Fall. 3 credits. Prerequisites: A good undergraduate solid-state physics course, such as Physics 454. A. Sievers.
A survey of the basics of the physics of solids. Metals, crystal structures, electron and phonon states, semiconductors, some advanced topics. At the level of Solid State Physics, by Ashcroft and Mermin.

PHYS 636 Solid-State Physics II
Spring. 3 credits. Prerequisite: Physics 635. A continuation of Physics 635; magnetism, insulator transitions.

PHYS 645 High-Energy Particle Physics
Fall. 3 credits. D. G. Cassel.
Introduction to the physics of baryons, mesons, and leptons. Strong, electromagnetic, and weak interactions. Relevance of symmetry laws to particle physics. Introduction to the quark model. At the level of Introduction to High Energy Physics, by Perkins.

PHYS 646 High-Energy Particle Physics
Spring. 3 credits. T-M. Yan.
Topics of current interest, such as high-energy electron and neutrino interactions, electron positron annihilation, and high-energy hadronic reactions, are surveyed. Lectures and reading material are at the level of Introduction to High Energy Physics, by Perkins.

Note: Only S-U grades will be given in courses numbered 650 or above.

PHYS 651 Relativistic Quantum Field Theory I
Fall. 3 credits. S-U grades only. T-M. Yan.
Topics to be covered include consequences of causality and Lorentz invariance, field quantization, perturbation theory, calculation of cross sections and decay rates, and an introduction to radiative corrections and renormalization with applications to electromagnetic and weak interactions.

PHYS 652 Relativistic Quantum Field Theory II
Spring. 3 credits. S-U grades only. A. LeGraer.
This course is a continuation of Physics 651 and introduces more advanced methods and concepts in quantum field theory. Topics include functional integral methods, quantization of non-abelian gauge theories, the renormalization group, dispersion relations, and spontaneous symmetry breaking. Applications to the electroweak theory and quantum chromodynamics are emphasized.

PHYS 653 Statistical Physics
Fall. 3 credits. Normally taken by graduate students in their second or later years. Prerequisites: Competence in the basic principles of quantum mechanics, statistical physics at the level of Physics 562, and thermodynamics. S-U grades only. C. Henley.
Survey of topics in modern statistical physics: Dynamical statistical physics (kinetic theory, Boltzmann equation, hydrodynamics); theory of simple fluids; scaling theories and the renormalization group; phase transitions in disordered systems; pattern formation in nonlinear systems, percolation theory.

PHYS 654 Theory of Many-Particle Systems
Spring. 3 credits. Prerequisites: Physics 562, 574, 635, 636, and 653. S-U grades only.
Equilibrium and transport properties of microscopic systems of many particles studied at zero and finite temperatures. Formalisms such as thermodynamic Green’s functions are introduced and applied to such topics as normal and superconducting Fermi systems, superfluidity, magnetism, insulating crystals.

PHYS 655 Advanced Topics in High Energy Particle Theory
This course will present advanced topics of current research interest. Subject matter will vary from year to year. Some likely topics are two-dimensional conformal field theory, applications to string theory and condensed matter physics, applications of the electroweak theory, lattice gauge theory, mathematical methods (e.g. group theory), perturbative quantum chromodynamics, anomalies and geometry, current algebra, heavy quark physics, heavy quark symmetry and phenomenological issues beyond the standard model.

PHYS 656 Topics in Theoretical Astrophysics
For description, see ASTRO 699.
PHYS 670 Instrumentation Seminar
Spring. 2 credits. S-U grades only. Knowledge and performance of innovative instrumentation in condensed matter and elementary particle physics.

PHYS 680 Computational Physics (also Astronomy 680)
For description, see PHYS 480.
PHYS 681-689 Special Topics
Offerings are announced each term. Typical topics are group theory, analyticity in particle physics, weak interactions, superfluids, stellar evolution, surface physics, Monte Carlo methods, low-temperature physics, magnetic resonance, phase transitions, and the renormalization group.

PHYS 690 Independent Study in Physics
Fall or spring. Variable to 4 credits. Students must advise department course coordinator, 121 Clark Hall, of faculty member responsible for grading their project. S-U grades only. Special graduate study in some branch of physics, either theoretical or experimental, under the direction of any professorial member of the staff.

PORTUGUESE
See Modern Languages and Linguistics.

PSYCHOLOGY

PHYSICS

The Major
Admission to the major is usually granted to any student in good standing in the college who has passed three or more psychology courses with grades of C+ or better. Faculty admission requires two such courses. To apply for the major and receive an adviser, a major application form may be obtained from the department office (211 Urs Hall). Requirements for the major are:

1) A total of 40 credits in psychology (including prerequisites), from which students majoring in psychology are expected to choose in consultation with their advisers, a range of courses that covers the basic processes in psychology (laboratory and/or field experience is recommended); and
2) Demonstration of proficiency in statistics before the beginning of the senior year. (See the section below on the statistics requirement.)

Normally it is expected that all undergraduate psychology majors will take at least one course in each of the following three areas of psychology:

1) Human experimental psychology
2) Biopsychology
3) Social, personality, and abnormal psychology

The following classification of Department of Psychology offerings is intended to help students and their advisers choose courses that will ensure that such breadth is achieved.

2) **Biopsychology.** Psychology 123, 276, 307, 322, 324, 326, 352, 361, 375, 396, 420, 422, 424, 425, 429, 431, 492.

3) **Social, personality, and abnormal psychology.** Psychology 128, 265, 275, 277, 280, 325, 327, 328, 380, 402, 404, 450, 481, 489, 491.

4) **Other courses:** Psychology 101, 199, 347, 350, 410, 440, 441, 470, 471, 472, 473, 475, 478, 479, 499. Recommendations for the major adviser determines to which group, if any, these courses may be applied.

With the permission of the adviser, courses in other departments may be accepted toward the major requirements.

**Fieldwork, independent study, and teaching.** The department requires students to observe the following limits on fieldwork, independent study, and teaching.

1) Undergraduates may not serve as teaching assistants in psychology courses if they are serving as teaching assistants for any other course during the same semester.

2) An undergraduate psychology major cannot apply more than 12 of the credits earned in independent study (including honors work) and fieldwork toward the 40 credits required by the major.

**Statistics requirement.** Proficiency in statistics can be demonstrated in any one of the several ways listed below.

1) Passing Psychology 350.

2) Passing an approved course or course sequence in some other department at Cornell. The approved list of courses and sequences may change. It has usually included Sociology 301, and the sequences Education 352 and 353, and Industrial and Labor Relations 210 and 211. Requests that a particular course be added to this list may be made to Professor Gilovich.

3) Passing a course or course sequence in statistics at some other college, university, or college-level summer school. The course or course sequence must be equivalent to at least 6 semester credits. The description of the course from the college catalog and the title and author of the textbook used must be submitted to Professor Gilovich for approval.

4) Passing an exemption examination. This examination can be given at virtually any time during the academic year if the student gives notice at least one week before. Students who have completed a theoretical statistics course in a department other than psychology or engineering and who wish to demonstrate competence in applied statistics usually find this option the easiest. Students planning this option should discuss it in advance with Professor Gilovich.

**Concentration in biopsychology.** Psychology majors interested in psychology as a biological science can elect to specialize in biopsychology. Students in this concentration must meet all of the general requirements for the major in psychology and must also demonstrate a solid background in biology, the physical sciences, including at least introductory chemistry, and mathematics. Students will design with their advisers an integrated program in biopsychology built around courses on physiological, psychological, anatomical, and ecological determinants of human and nonhuman behavior offered by the Department of Psychology. Additional courses in physiology, anatomy, biochemistry, neurochemistry, neurobiological, and behavioral biology may be designated as part of the psychology major after consultation between the student and his or her biopsychology adviser.

**Concentration in personality and social psychology.** This concentration is offered in cooperation with the Department of Sociology. Psychology majors who wish to specialize in social psychology are expected to meet the general requirements set by their department, including statistics. To ensure a solid interdisciplinary grounding, students in the concentration will be permitted to include some major courses in sociology and related fields. Advisers will assist students in the selection of a coherent set of courses from social organization, cultural anthropology, experimental psychology, social methodology, and several areas in psychology and sociology. Juniors in the concentration may elect advanced and graduate seminars, with the permission of the instructor.

**Undergraduate honors program.** The honors program is designed for those exceptionally able students who wish to pursue an intensive and independent program of research in psychology. Successful participation in this program serves as evidence of the student's facility in the two most important skills of an academic psychologist: the capacity to acquire and integrate a substantial body of theoretical and factual material and the ability to engage in creative research activity. All qualified students planning on a graduate education in psychology or other academic fields should consider the honors program seriously. The program offers most students the closest contact and consultation with faculty that they will receive during their time at Cornell.

The core of the honors program is a research project that the student carries out in close collaboration with an advisor elected by the student as a member in the field of psychology. It is assumed that most students will do so while enrolled in Psychology 470 (Undergraduate Research in Psychology). A written report of the research is to be given before the committee (currently Professor Field) toward the end of the last semester of the student's senior year. An oral defense of the thesis is then given before a committee of three faculty members, and the student presents his or her work in a public forum. Final honors standing (summa cum laude, magna cum laude, cum laude) is indicated on the student's diploma. The T. A. Ryan Award, accompanied by a certificate, is awarded to the student who conducts the best honors project in a given year.

A student may formally apply to the honors program at any time during the senior year provided that she or he is actively engaged in independent research. However, students must do so by the end of November. Applications should be given to Professor Field and should be made directly by the student.

**Distribution requirement.** The distribution requirement in the social sciences is satisfied by any two courses in psychology with the exception of Psychology 123, 276, 307, 322, 324, 326, 352, 356, 375, 396, 410, 420, 422, 424, 425, 429, 431, 470, 471, 472, 473, 475, 478, 479, 491, 492.

**Note:** The Department of Psychology has listed all days and times for each course that we offer. If there should be changes in the days, times, or semester that a course is offered, we will post the necessary changes throughout the department and in the supplements of the Course and Time and Course and Room Rosters.

**Courses.**

**PSYCH 101 Introduction to Psychology: The Frontiers of Psychological Inquiry**

Fall. 3 credits. Students who would like to take a discussion seminar should also enroll in Psychology 103. M W F 10:10. J. B. Maas.

The study of human behavior. Topics include brain functioning and mind control, psychophysiology of sleep and dreaming, psychological testing, perception, learning, cognition, memory, language, motivation, personality, abnormal behavior, psychotherapy, social psychology, and other aspects of applied psychology. Emphasis is on developing skills to critically evaluate claims made about human behavior.

**PSYCH 103 Introductory Psychology Seminars**

Fall. 1 credit. Limited to 300 students. Prerequisite: concurrent enrollment in Psychology 101. Hours to be arranged. 32 different time options. J. B. Maas and staff.

A weekly seminar that may be taken in addition to Psychology 101 to provide an in-depth exploration of selected areas in the field of psychology. Involves extensive discussion and a term paper related to the seminar topic. Choice of seminar topics and meeting times will be available at the second lecture of Psychology 101.

**PSYCH 111 Freshman Writing Seminar: Perspectives in Psychology**

Fall and spring. 3 credits. Limited to 17 students. Not offered 1995-96. Hours to be arranged. Staff.

Psychological theories do not develop in a vacuum. The lives of 'great people' in any field are just as chaotic and unpredictable as are our own individual lives. By looking at specific figures in the history of psychology, their backgrounds and cultural settings, we will attempt to develop a deeper understanding of the dynamic social contexts in which our views are formed. In readings and discussion this semester, we hope to introduce you to social figures and events that have shaped our conceptions of our world(s) and lives. Beginning with early theoretical perspectives (e.g., Freud; Jung), we will work our way into more contemporary perspectives, such as sexuality, prejudice, sub-culture, drug use, etc.

**PSYCH 112 Freshman Writing Seminar: Psychology and the Arts**

Fall. 3 credits. Limited to 17 students. M W F 12:20-1:25. C. Lunney.

In this course, we will consider psychology (personality, cognitive and perceptual) as it relates to the creative arts. We will address the questions of how and why an artist creates by focusing on the development of artistry and the creative process itself. We will also
discuss the aesthetic experience, in terms of both objective characteristics of artworks and subjective characteristics of the audience. Through readings (theoretical, autobiographical and empirical), class discussions and a series of short writing assignments, we will attempt to solve the "puzzle of art." Although our focus will be mainly on the visual arts and music, students will be able to incorporate their interests in other art forms in their final research papers.

[PSYCH 113 Freshman Writing Seminar: Reproductive Decision Making in the 90s]
Spring. 3 credits. Limited to 17 students. Not offered 1995-96. Hours to be arranged. Staff.

The art and science of human reproduction is more complex in the 1990s than ever before. Modern technology and changing family and social systems afford nontraditional options for the bearing and rearing of children, and Americans are struggling with practical as well as ethical issues related to these topics. In this seminar, we will explore the possibilities for forming families, and ethical issues in modern technology. We will gain understanding of these topics through class discussions, essays, and research papers.

[PSYCH 114 Freshman Writing Seminar: Psychology and the Holocaust]

This course will seek to gain understanding of some of the phenomena of the Holocaust through the lenses of psychology, as well as using the Holocaust as a window to understand humanity and ourselves. Four major themes will be examined: 1) We will look at survivor syndrome—how victims deal with trauma, and the possible long-term effects of trauma on survivors and their families. 2) We will examine altruism and what motivates some people to risk their own lives to save others. 3) We will examine conformity and what circumstances create a society where people will perform atrocities or stand by while others perform them. 4) Finally, we will examine the ethics of medical experimentation and relate it to current experimental ethics: what rationale was used to justify it, how did it go wrong, and do similar excesses take place in American scientific experimentation? The course will consider how we can apply some of the lessons of the Holocaust to form a kinder society, and how we can design systems that prevent such atrocities from occurring. This seminar will consist of brief experiments to demonstrate the principles we will be discussing, and some writing assignments will involve drawing conclusions from these experiments.

[PSYCH 115 Freshman Writing Seminar: What Do Animals Tell us About Ourselves?]
Fall. 3 credits. Limited to 17 students. T R 1:25-2:40. D. F. Gudemuth.

The course will involve reading (and occasionally viewing films) about various aspects of research conducted with nonhuman animals that seem to relate rather directly to human behavior. We will discuss this relationship in class—is it valid? in what way?—and students will choose specific positions and write essays that clearly outline their arguments and opinions on the covered topics. Examples of planned topics include comparing learned helplessness in animals to human depression, ape language learning and tool use to that of humans, and various social interactions such as parenting, competition, and altruism.

[PSYCH 116 Freshman Writing Seminar: Health-Care Decisions: Ethical Issues and Dilemmas]

Modern medicine has progressed at a rapid pace. Today we are able to vaccinate against disease, change our physical appearance, and transplant organs. Along with the many advances in modern medicine, ethical issues regarding health-care have been raised. In this seminar we will examine issues such as who should receive necessary organ transplants when there is a tremendous lack of resources, the rising costs of health-care, and the possibility of a universal health-care system. Other topics will include ethical dilemmas surrounding medical decisions such as alternative medicine, organ donation, and euthanasia. Students will examine these as well as other issues through readings, class discussions, and essays.

[PSYCH 117 Freshman Writing Seminar: Applying Psychological Principles to Making Psychology Work for You]
Fall and spring. 3 credits. Limited to 17 students. M W F 1:25-2:15. J. Barrett and D. Simons.

How can psychology help you with romance? How can it improve your ability to persuade others? Can memory research help you study more effectively? This course will initially consider how research meant to be applied to a particular area can be integrated into your daily life. As the term progresses, we will consider applications of psychological principles from laboratory research to situations more distant from their original claims. Throughout the term, we will evaluate the validity of our applications. Writing assignments will focus on applying the principles we discuss to personal experiences. We may also have the opportunity to conduct experiments to demonstrate the principles we will be discussing, and some writing assignments will involve drawing conclusions from these experiments.

[PSYCH 123 Introduction to Biopsychology]
Fall. 3 credits. No prerequisites. Can be used to satisfy the psychology major breadth requirement and as an alternative prerequisite for upper-level biopsychology courses. Students who would like to take a discussion/demonstration seminar should also enroll in Psych 125; a one hour per week extra credit section. M W F 10:10. E. A. Regan.

An introduction to psychology from a biological perspective, including both evolutionary and physiological approaches to behavior. Topics include the structure, function, and development of the nervous system, genetic and biochemical bases of behavior, hormones and behavior, biological bases of learning, cognition, communication, and language; and the ecology and evolution of social organization and social development.

[PSYCH 125 Introduction to Biopsychology Seminars]
Fall. 1 credit. 2 sections with a maximum of 16 students in each. Prerequisite: concurrent enrollment in Psychology 123.

A weekly seminar that may be taken in addition to Psychology 125 to allow and encourage "hands-on" involvement with some of the course materials, including use of interactive computer programs and models to get a clearer picture of basic neuroanatomy, visits to the laboratories of biopsychology faculty, films, reading, writing, and discussion of course material. Involves several small assignments equivalent to a 10-page paper.

[PSYCH 128 Introduction to Psychology: Personality and Social Behavior]
Summer only. 3 credits. M-F 10:10-11:15. Staff.

Personality: the behavioral similarities and differences among people and how they develop; Freudian, learning, and humanistic theories of personality; research in personality; and personality assessment through testing. Social behavior: how people behave in interactions with others, attitudes, persuasion, attraction, aggression, and conformity. How personality and social behavior influence each other and cause many interesting social and psychological phenomena.

[PSYCH 199 Sports Psychology]

Introductory courses in cognitive psychology. Each of the following four courses (205, 209, 214, 215) provides an introduction to a major area of study within cognitive psychology. These courses are independent of one another, and none has any prerequisites. Students may take any one of the courses or any combination of them (including all four). Courses may be taken in any order or simultaneously.

[PSYCH 205 Perception]
Spring. 3 credits. Open to first-year students. Graduate students, see Psychology 605. T R 11:40-12:55. J. E. Cutting.

One of four introductory courses in cognitive psychology. Basic perceptual concepts and phenomena are discussed. Emphasis on stimulus variables and sensory mechanisms. All sensory modalities are considered. Visual and auditory perception are discussed in detail.

[PSYCH 209 Developmental Psychology]
Spring. 4 credits. Graduate students, see Psychology 709. T R 11:40-12:55. C. Keil.

One of four introductory courses in cognition and perception. A comprehensive introduction to current thinking and research in developmental psychology. Approaches problems primarily from a cognitive perspective. The course focuses on the development of perception, action, cognition, emotion, personality, social understanding, language, and moral reasoning.
emphasizes the social-psychological processes by which the culture transforms male and female newborns into "masculine" and "feminine" adults. In addition to being quite interdisciplinary, the course is also oriented to questioning the "naturalness" of not only masculinity and femininity, but also of exclusive heterosexuality as well. Among some of the specialized topics discussed are: psychological androgyny, equilibrarian relationships, gender-liberated child-rearing, the male-centeredness of the workworld, female sexuality, sexual harassment, and homophobia.

**PSYCH 280 Introduction to Social Psychology**
- Spring. 3 or 4 credits; the optional (fourth) credit requires a research project. Prerequisite: an introductory psychology course. T R 10:10–11:25. T. D. Golovich and D. T. Ragan.

An introduction to research and theory in social psychology. Topics include processing of social information, social influence, persuasion, and attitude change; social interaction of group phenomena. The application of social psychological knowledge to current events will also be discussed.

**PSYCH 305 Visual Perception**
- Fall. 4 credits. Limited to 20 students. Prerequisite: Psychology 205 or permission of instructor. M W F 10:10. J. E. Cutting.

A detailed examination of theories and processes in visual perception. Topics may include the perception of color, form, and motion; perceptual constancies; adaptation; pattern perception, and photography, television, and film.

**PSYCH 307 Chemosensory Perception**
- Fall. 3 or 4 credits, the optional (fourth) credit is for an independent laboratory project. Registration for the 4-credit option requires permission of the instructor; students will read, analyze, and discuss difficult original literature in the areas covered. Prerequisites: Psychology 205 and a course in psychology. M W F 1:25.

An examination of basic theory, data, and processes for perception of the chemosensory environment. After a very brief (about two weeks) lecture survey of the anatomy and physiology of human taste and olfaction, the remainder of the course uses the Socratic method, in which the instructor asks questions of the students, to cover topics such as chemosensory psychophysics, saliva, chemosensory biases for the tastes of foods, taste-smell interactions, chemosensory function in neonates and in the aged, temporal aspects of perception, sweetness, effects of pollution of the chemosensory environment, and interactions between body state and chemosensory stimuli. At the level of the article, "Smell and Taste in Health and Disease," edited by T. V. Giedt, T. D. Golovich, and S. E. Spelke. An introduction to theories and research on the origins and development of knowledge of the immediately surrounding world. The course focuses on knowledge of the world as an arrangement in space and time, knowledge of the world as a space that can be encountered through multiple sensory modes, knowledge of the world as a place that can be acted upon, and organization of the world into meaningful objects and events.

**PSYCH 311 Human Learning and Memory**
- Fall. 3 credits. Limited to 20 students. Prerequisite: Psychology 116. M W F 10:10. J. E. Cutting.

This course offers an overview of the experimental findings and theoretical issues in the study of human learning and memory. Coverage includes topics such as the nature of memory, various memory systems, coding and retrieval processes, practice and habit acquisition, organization for learning and memory, interference and forgetting, models of learning and memory, memory dysfunction and its relation to normal memory.

**PSYCH 316 Auditory Perception**
- Fall. 3 or 4 credits, the 4-credit option involves a laboratory project or paper. Prerequisite: Psychology 205, 209, 214, or 215 (other psychology, linguistics, or biology courses could serve as prerequisite with permission of the instructor). Limited to 30 students. Applicant students, see Psychology 716. T R 10:10–11:25. C. L. Krumhansl.

Basic approaches to the perception of auditory information, with special consideration of complex topics such as speech, music, and environmental sounds.

**PSYCH 322 Hormones and Behavior**
- Spring. 3 or 4 credits; the 4-credit option involves a one-hour section once a week in which students will be expected to read original papers in the field and participate in discussion. Limited to juniors and seniors; open to sophomores only by permission. Prerequisites: BIOL 221 or 222 or one year of introductory biology plus a course in psychology. S-U grades optional. Graduate students may take the graduate version, Psychology 722. M W F 1:25–2:15. D. Guderzum.

Following a review of the neural and endocrine systems, this course connects endocrine physiology to specific behaviors observed in various species, including humans. Although the relationship between sexual physiology and behavior is strongly emphasized, the lectures also describe hormonal contributions to behavior, aggression, stress, learning and memory, homeostasis and biological rhythms. Topics for the discussion sections are chosen by the students within the context of hormonal influences on behavior.

**PSYCH 324 Biopsychology Laboratory**
- Also BIOL 324. Fall. 4 credits. Limited to 20 juniors and seniors. Prerequisites: Psychology 123 or BIOL 221 or 222, and permission of instructor. T R 1:25–4:25. T. J. DeVoogd.

Experiments designed to provide experience in animal behavior (including learning) and its neural and hormonal mechanisms. A variety of techniques, species, and behavior patterns are included.
PSYCH 325 Psychopathology
Fall. Spring. 4 credits. Prerequisite: 2 courses in psychology. M W F 11:15. K. L. Lockhart.
This course examines the nature and symptoms of the major forms of psychopa-thology. Etiological factors are studied from a variety of different perspectives, e.g., biological, psychological, and socio-cultural. Treatment approaches to psychopathology are covered in weekly discussion sections.

PSYCH 326 Evolution of Human Behavior
Fall. 4 credits. Prerequisite: Psychology 123, or an introductory biology course, or an introductory anthropology course. Graduate students, see Psychology 626. T R 12:20-1:10. R. E. Johnston.
A broad comparative approach to the behavior of animals and humans with special emphasis on the evolution of human behavior. Topics covered will vary but will include some of the following: human evolution, evolutionary and sociobiological theory, animal communication, nonverbal communication, language, cognitive capacities, social organization, cooperation and altruism, sexual behavior, mating and marriage systems, aggression, warfare.

PSYCH 327 Fieldwork in Psychopathology and the Helping Relationship
Fall, spring. 4 credits. Prerequisites: Psychology 325, HDFS 370 or concurrent registration in 325 or HDFS 370 and permission of instructor. S-U grades only. Students do not enroll in advance for this course. Field placement arrangements are made during the first two weeks of the semester. Students who have already taken Psychology 325 or HDFS 370 must contact the instructor during the first week of the semester. Enrollment is limited by the fieldwork placements available. Fee, $25 each semester. T R 12:20-1:10. K. L. Lockhart and staff.
This is a year-long lecture and discussion course. The year-long commitment is mandatory. A "R" grade will be given for students taking the course the second time. An "R" grade will be assigned in the fall semester, and a S-U grade will only be assigned in the spring semester.

PSYCH 328 Continuing Fieldwork in Psychopathology and the Helping Relationship
Fall, spring. 4 credits. Prerequisites: Psychology 325, 327, or HDFS 370 and permission of instructor. S-U grades only. May not be taken more than twice. Students do not enroll in advance for this course. Fee, $25 each semester. T R 12:20-1:10. K. L. Lockhart and staff.
Designed to allow students who have done fieldwork as part of Psychology 327 to continue their field placements or begin new field placements under supervision for academic credit. An "R" grade will be assigned in the fall semester, and a S-U grade will only be assigned in the spring semester.

PSYCH 329 Biopsychology of Learning and Memory (also BIONB 328)
Spring. 3 credits. Prerequisites: one year of biology and either a biopsychology class or BIONB 222. Limited to 60 students. Graduate students, see Psychol-ogy 632 or 643. J. DeVoogt.
This course will survey the approaches that have been or are currently being used in order to understand the biological bases for learning and memory. Topics will include invertebrate, "simple system" approaches, imprinting, avian song learning, hippocampal and cerebellar function, and human pathol­ogy. Many of the readings will be from primary literature.

PSYCH 342 Human Perception: Applications to Computer Graphics, Art and Visual Display
Fall. 3 or 4 credits. The 4-credit option involves a term paper. Prerequisite: Psychology 101 or permission of instructor. Psychology 205 strongly recommended. Graduate students, see Psychology 642. T R 11:40-12:55. D. J. Field.
Our present technology allows us to transmit and display information over a variety of media. To make the most of these media, it is important to understand the limitations and abilities of the human observer. The course will consider a number of applied aspects of human perception with an emphasis on the display of visual information. Topics to be covered include: "Three-dimensional" display systems, color theory, spatial and temporal limitations of the visual systems, attempts at subliminal communication, and "visual" effects in film and television.

PSYCH 347 Psychology of Visual Communications
Spring. 3 credits. Limited to 12 students. Prerequisites: Psychology 101 and permission of instructor. R 10:10-12:05. J. B. Maas.
An exploration of theories of education, communication, perception, attitude, and behavior change that relate to the effectiveness of visually based communication systems. Emphasis is on the use of photography and computer graphics to deliver educational messages.

PSYCH 350 Statistics and Research Design
Acquaints the student with the elements of descriptive statistics and probability. Emphasis is placed on those statistical methods of principal relevance to psychology and related behavioral sciences.

PSYCH 351 Biopsychology of Normal and Abnormal Behavior (also Nutritional Sciences 361)
Fall. 3 credits. Prerequisites: an introductory psychology course, and an introductory biology course, or permission of instructor. S-U grades optional. Juniors and seniors only. M W F 3:05-3:55. B. J. Strupp.
A critical evaluation of factors thought to underlie normal and abnormal behavior and/or cognitive functioning. Psychological, biological, and societal influences will be integrated. Topics include: (1) psychiatric disorders (e.g., depression, schizophrenia, eating disorders); (2) the biopsychology of learning, memory, and intelligence; (3) nutritional influences on behavior (sugar, food additives, malnutrition, dieting); (4) cognitive dysfunction (e.g., amnesia, Alzheimer's disease); (5) psychoactive drugs (e.g., hallucinogens, stimulants), and (6) developmental exposure to environmental toxins and drugs of abuse.

PSYCH 375 Developmental Psychobiology: Motivational Processes (also Nutritional Sciences 375)
This course focuses on motivational and experiential influences on motivational processes in animals and humans. Emphasis is placed on the mechanisms underlying mother-infant interactions, and the development of feeding, drinking, and reproduction behaviors.

PSYCH 380 Community Mental Health (also Human Service Studies 380)
Summer only. 3 or 4 credits (4-credit option involves term paper). Registration for the 4-credit option requires permission of instructor. Prerequisites: an introductory course in biology or biopsychology, plus a second course in neurobiology or behavior or perception or cognition or biopsychology. Students will be expected to have some knowledge of community health, psychology, behavior, and chemistry. Auditors. Offered alternate years. Graduate students, see Psychology 696. Not offered 1996-97. M W F 10:10. B. P. Halpem.
The course will be taught using the Socratic method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class difficult original literature dealing with both those characteristics of sensory systems that are common across living organisms and those sensory properties which represent adaptations of animals to particular habitats or environments. Classroom discussion can increase, but not decrease, a student's final grade. There are two preliminary exams and a final exam. The principles and limitations of major methods used to examine sensory systems will be considered. General principles of sensory systems, and auditory, visual, and somesthetic systems are covered. One aspect of each system (e.g., localization of objects in space by sound, color vision, thermoreception) will be selected for special attention. There are three textbooks and a course packet of reproduced articles will be used. An Introduction to the Physiology of Hearing, 2nd edition by J. O. Pickles; Hearing: Physiological and Psychological Aspects, Neural Coding, Perception, Psychoacoustics, by W. L. Gulick, G. A. Gescheider, and R. D. Frisina; The Retina: An Approachable Part of the Brain, by J. E. Dowling; Handbook of Physiology—The
This seminar will focus on knowledge and reasoning about space, time, number, physical objects, and persons. Questions will include: (1) How do cognitive abilities vary across species? Are there ways of reasoning that are distinctly human? (2) Do humans and/or other animals reason in the same way about entities in different domains (e.g., numbers, physical objects, and persons)? (3) How do knowledge and reasoning change throughout human development? Is knowledge enriched, or more radically restructured, as children grow and gain experience?

**PSYCH 415 Concepts, Categories, and Word Meanings**

Fall. 4 credits. Prerequisites: Psychology 205, 209, 214, or 215, or permission of instructor. Graduate students, see Psychology 615. T 1:25-4:25. F. C. Keil.

A consideration of what types of categories are psychologically distinct, how different ways of categorizing are related, and how the way categories change and concept acquisition. Other topics include: relations between concepts and broader knowledge representation systems such as scripts, mental models, and intuitive theories; relations of informative and beliefs in concept structure; categorization in other species; neuropsychological studies of categorization; comparisons of categorization systems across cultures; and comparisons of concept structures across different types of categories.

**PSYCH 417 The Origins of Thought and Knowledge**

Fall. 4 credits. Prerequisites: Psychology 205, 209, 214, or 215, or permission of instructor. Graduate students, see Psychology 717. Not offered 1995-96. T 1:25-4:25. F. C. Keil.

An in-depth analysis of current theories concerning the growth of thought and knowledge in childhood. Several controversies will be discussed in detail, including: are mental abilities organized in local domains or modules that have their own patterns of development, or is cognitive development a more general process? Do comparative studies with other species and evolutionary models provide useful insights into cognitive development in humans? Are there qualitative restructurings of thought and knowledge with development, or is the process more continuous in nature? What restrictions should these developmental considerations place on models of thought and knowledge in adults?

**PSYCH 418 Psychology of Music**

Spring. 3 or 4 credits, depending on whether student elects to do an independent project. Prerequisites: junior or senior standing with major in psychology or music and with permission of instructor. Graduate students, see Psychology 618. M W 2:55-4:10. C. L. Krumhansl.

Detailed analysis of topics in the psychology of music, including theories of consonance, perception of tonal-harmonic structure, memory for music, and effects of musical training. Emphasis given to experimental methodologies.

**PSYCH 419 Neural Networks Laboratory**

Spring. 4 credits. Prerequisites: at least one course in biology or biological psychology, one year of calculus, and permission of instructor. Limited to 15 students. Graduate students, see Psychology 619. Not offered 1995-96. T R 2:55-4:10. D. J. Field.

The course will take a hands-on approach to understanding the limitations and successful applications of neural networks to problems in cognitive and biological psychology. A variety of neural network architectures will be discussed and explored using computer simulations. Applications of networks to perceptual representation and recognition will be emphasized. We will consider the class of problems that different networks can solve and consider the accuracy with which they model real nervous systems. Students will complete weekly lab reports and develop one independent project demonstrating the application of a neural network to a problem discussed in the course.

**PSYCH 420 Laboratory in Neuroethology (also BIONB 420-03)**

Spring. 1 credit. Prerequisite: BIONB 424 or Psychology 424 or equivalent. Permission of instructor. Lab: M 12:00-5:00. C. D. Hopkins. Designed as a laboratory component for BIONB 424/PSYCH 424, this course will illustrate principles of neuroethology: sensory processing, neuromotor, and behavioral analysis. Students will participate in six laboratory exercises scheduled throughout the semester. The laboratory will be open from 12:20 until 5:00 p.m. on Mondays and Wednesdays. Labs will be conducted in groups of two. Students in this course will learn the fundamentals of electrophysiology, neuroanatomy, and behavior through a series of six laboratory exercises using electric fish, Drosophila, crayfish, and Limulus, bats and moths.

**PSYCH 422 Developmental Biopsychology**

Fall. 4 credits. Prerequisites: a course in introductory biology and a course in biopsychology or neuropsychology (such as Psychology 123 or BIONB 221). Graduate students, see Psychology 622. Not offered 1995-96. M W F 9:05-9:55. B. L. Finlay.

We will discuss the relationship of the development and evolution of the brain to the development of behavior. Topics include how neurons are generated, find targets, and establish connections; the emergence of reflexive and complex behavior; how experience affects the developing brain; evolutionary perspectives on the development of perception, memory, and communication systems; and abnormal development.

**PSYCH 424 Neuroethology (also BIONB 424)**

Spring. 3 credits. Prerequisites: BIONB 221 and 222. S-U grades optional for graduate students only. T 9:05-11:00, R 9:05-9:55. Class will be held on TR at 9:05-11:00. Thursday's class will run for one hour. Recitations will be scheduled in class. C. D. Hopkins.

In the 1950's-1970's ethologists attempted to understand the mechanisms of animal behavior through the use of comparative methods, evolutionary analysis, careful observations of animals in their native habitats, and clever experimentation. Now, with the explosion of knowledge and...
techniques in the neurosciences, many of the ethologist’s mechanisms are being explained in terms of neural systems. This course will review the current status of research in neuroethology, including: mechanisms of acoustic communication in insects and in vertebrates; echolocation in bats and sound localization in owls; electrophysiology; chemical communication; and visual processing. In addition, it will review advances in the central nervous system: in decision making, in initiating action, and in coordinating fixed acts. Assigned readings will include original articles from the scientific literature. A term paper/poster on neuroethology will be required.

**[PSYCH 425 Brain and Behavior](#)**

Fall. 3 or 4 credits (4-credit option includes a discussion section and requires an additional paper). Prerequisites: a course in introductory biology and a course in biopsychology or neurobiology (such as Psychology 123 or BIONB 221). Graduate students, see Psychology 625. Not offered 1995–96. M W 9:05–9:55. B. L. Finlay.

We will study the relation between structure and function in the central nervous system. The first part of the course will be devoted to embryonic and mechanistic approaches for understanding the human behavior and cognition will be stressed. The course will focus on issues in cognitive neuroscience: mechanisms of perception, particularly vision, and the neuropsychology of everyday acts involving complex cognitive skills such as recognition of individuals, navigation in the world, language, memory, and social interaction.

**[PSYCH 429 Olfaction and Taste: Structure and Function (also BIONB 429)](#)**

Fall. 3 or 4 credits (4-credit option requires a term paper or research project. The research project can, but does not need to, study nonhuman vertebrates). Preference given to junior and senior psychology and biology majors and graduate students. Prerequisite: one 300-level course in biopsychology or equivalent. Graduate students, see Psychology 629. Not offered 1995–96 or 1996–97. T R 10:10–11:25. B. P. Halpern.

The structural and functional characteristics of olfaction and taste will be explored by reading and discussing current literature in these areas. Structure will be examined at the level of electron microscopes as well as at the molecular level. Function will be primarily neurophysiological and biochemical aspects. The emphasis will be on vertebrates, especially air-breathing vertebrates in the case of olfaction, but invertebrates will be covered as well. We will use a textbook and a course packet of reproduced articles will be used. At the level of Smell and Taste in Health and Disease, edited by T. V. Gutchell, R. L. Doty, L. M. Bartoshuk, and J. B. Snow, the Neurobiology of Taste and Smell, edited by T. E. Finger and W. L. Silver.]

**[PSYCH 431 Effects of Aging on Sensory and Perceptual Systems (also BIONB 421)](#)**

Fall. 3 or 4 credits, the optional (or fourth) credit is for laboratory observation. Prerequisites: an introductory course in biology or psychology, plus a second course in perception or neurobiology or cognition or psychology. No auditors. Limited to 25 students. Graduate students, see Psychology 631. T R 10:10–11:25. B. P. Halpern. A literature-based examination of post-maturational changes in the perceptual, structural, and physiological characteristics of somesthetic, chemesthetic, visual, and auditory systems. Emphasis will be on human data, with non-human information included when especially relevant. Current developments in human sensory prosthetic devices, and in regeneration and recovery of injured structures, will be examined. Brief written statements (by electronic mail) of questions and problems related to each set of assigned readings will be required at least one day in advance of each class meeting. This course will be taught using the Socratic Method, in which the instructor asks questions of the students. Students read, analyze, and discuss in class. Difficult original literature dealing with the subject matter of the course. Students are expected to come to each class having already done, and thought about, the assigned readings.

**[PSYCH 436 Language Development (also Human Development and Family Studies 436 and Linguistics 436)](#)**

Spring. 4 credits. Prerequisite: at least one course in general psychology, cognitive psychology, cognitive development, or linguistics. Open to undergraduates and graduate students. S-U grades optional. Graduate students will also meet for additional advanced discussion of course content. Graduate students should also enroll under HDFS 700/Linguistics 700 (2 credits). T R 3:10–4:25. B. Lust. This course is a survey of basic issues, methods, and theories in the study of first language acquisition. Major theoretical positions in the field are considered in the light of experimental studies in first-language acquisition of phonology, syntax, and semantics from infancy on. The fundamental linguistic issues of “universal grammar” and the biological foundations for acquisition are discussed, as are the issues of relations between language and thought. The acquisition of all systems in nonhuman species such as chimpanzees is addressed, but major emphasis is on the child.

**[PSYCH 440 Sleep and Dreaming](#)**

Fall. 4 credits. Prerequisites: junior or senior standing and at least Psychology 123 or BIONB 221–222. A second course in biopsychology or neurobiology is recommended. S-U grades optional. Graduate students, see Psychology 640. Not offered 1995–96. T R 11:40–12:55. H. S. Porte.

The first part of this course emphasizes the neurobiology of sleep. Topics include sleep mechanisms of behavioral state change, the anatomy and physiology of the states and rhythms of sleep, theories of the evolution and plausible functions of sleep. Students will keep and analyze records of their own sleep patterns. The second part of the course emphasizes psychological experience in sleep. Topics include nightmare and other experiences originating in non-REM sleep, and dreams originating in REM sleep. Students will examine the data of dreams—including their own—in light of what they have learned about the neurobiology of dreaming sleep. They will evaluate dream theories from Freud’s to Freud’s, and will consider whether dreaming is meaningful or meaningless, less, encrypted or transparent, better remembered or better forgotten.

**[PSYCH 441 Laboratory in Sleep and Dreaming](#)**

Spring. 4 credits. Prerequisites: Psychology 440 or comparable preparation, and permission of the instructor during preregistration. T R 10:10–11:25. W 7:30–10:30 p.m. H. S. Porte. Emphasizing the neurobiology of sleep state, the course introduces the laboratory study of human sleep and dreaming. Serving as both experimenter and subject, each student will learn the rationale and methods of electromyography and other bioelectric measures of behavioral state. Using computerized data analysis, students will complete weekly laboratory reports and a collaborative term project. Sleep recordings will be done during the day or evening when possible. Occasional overnight recording sessions will follow the regular class meeting.

**[PSYCH 450 The Lenses of Gender (also Women’s Studies 450, Psychology 650, and Women’s Studies 650)](#)**

Fall. 4 credits. Permission of instructor. Limited to 12 seniors and graduate students. No preregistration; interested students should attend the first class session. Graduate students, see Psychology/Women’s Studies 650. Not offered 1995–96. W 2:30–4:30. S. L. Ben. This seminar analyzes the ideological, institutional, and psychological mechanisms that are responsible for the social reproduction of male power in Western—and, especially American—culture. It is very interdisciplinary, covering material from biology, history, anthropology, law, sociology, psychology, psychiatry, philosophy, and feminist theory. Part 1 analyzes three important organizing principles or “cultural lenses” that have come to be embedded in the social institutions and the cultural discourses of Western culture: (1) biological essentialism, (2) androcentrism, and (3) gender-polarization (including the stigmatizing of homosexuality). Part 2 analyzes how the individuals living within the context of these lenses are transformed from being male or female newborns to being masculine and “feminine” adults—how, in other words, the culture’s gender lenses are subtly transferred from the practices of the culture to the psyche of the individual. Part 3 considers possibilities for social and personal change.

**[PSYCH 470 Undergraduate Research in Psychology](#)**

Fall or spring. 1-4 credits. S-U grades optional. Written permission from the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that staff member. A section list is available from the Department of Psychology. Hours to be arranged. Staff.

Practice in planning, conducting, and reporting independent laboratory, field, and/or library research.

**[PSYCH 471 Advanced Undergraduate Research in Psychology](#)**

Fall or spring. 1-4 credits. S-U grades optional. Written permission of the staff member who will supervise the work and assign the grade must be included with the course enrollment material. Students should enroll in the section listed for that
be mostly primary sources. Among the theoretical approaches to social behavior we may discuss are social comparison theory, cognitive dissonance, attribution processes and social judgment, social exchange theory, dramaturgy and impression management, and biological perspectives.

PSYC 489 Seminar: Beliefs, Attitudes, and Ideologies
Spring. 4 credits. Prerequisites: one course in psychology or one course in sociology and permission of instructor during preregistration. W 2:30-4:30. D. J. Ben.
First, we will examine some fundamental properties of beliefs and attitudes: how they are formed and changed, what psychological functions they serve for the individual, and how they coalesce into belief systems or ideologies. Second, we will examine a number of ideologies in detail: for example, the political ideologies of the American public, gender, sexual orientation, the ideologically factors that promote anorexia in a society, the contrasting world-views of “pro-choice” and “pro-life” activists, the ideologies of psychology and science, and more. Participants will also be encouraged (via brief writing assignments and a term paper) to examine one or more of their own ideologies.

PSYC 491 Research Methods in Psychology
Spring. 4 credits. Enrollment limited to 25 students. Recommended: permission of instructor. Psychology 350, experience in upper-division psychology courses, or graduate standing. Graduate students, see Psychology 691. T R 10:10-11:25. D. A. Dunning.
An intensive examination of the basic research methods used in social, personality, cognitive, and developmental psychology. The course will focus on designing and conducting experiments, i.e., how to turn vague theories into concrete and testable notions, evaluate studies, avoid pitfalls, and, finally, remain ethical. Beyond learning methods of “correct” and rigorous experimentation, we will also discuss what makes a research study actually interesting. The course in addition, will cover test construction, survey methods, and “quasi experiments.” Students will concentrate on completing a small research project in which they conduct an experiment, interpret its data, and write up the results.

PSYC 492 Sensory Function (also BIONB 492)
Spring. 3 or 4 credits. The 4-credit option involves a one-hour section once a week, in which students are expected to participate in discussion. The 4-credit option is not always offered. Prerequisite: a 300-level course in biopsychology, or BIONB 222 or BIOAP 311, or permission of the instructor. Students are expected to have a knowledge of elementary physics, chemistry, and behavior. S-U grades optional. Offered alternate years. Graduate students, see Psychology 692.
This course covers classical topics in sensory science such as vision, hearing, touch and balance, as well as some more modern topics like sensory coding, location of stimulus sources in space, the development of sensory systems, and non-classical topics such as electroreception and internal chemoreceptors. Both human and nonhuman systems are discussed. In all cases the chemical, physical, and neurophysiological bases of sensory information are treated, and the processing of this information is followed into the central nervous system. At the level of The Senses, edited by Barlow and Mollon, and An Introduction to the Physiology of Hearing, 2nd edition, by Pickles.

Advanced Courses and Seminars
Advanced seminars are available 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 (211 Urs Hall). The following courses may be offered either term and carry 4 credits unless otherwise indicated.

PSYC 510-511 Perception
PSYC 512-514 Visual Perception
PSYC 515 Learning
PSYC 518 Topics in Psycholinguistics
PSYC 519-520 Cognition
PSYC 521 Psychobiology
PSYC 522 Topics in Perception and Cognition
PSYC 523 Hormones and Behavior
PSYC 524 Sex Differences in Brain and Behavior (also BIONB 626)
Spring. 2 credits. Limited to 12 seniors and graduate students. Not offered 1995-96. Hours to be arranged. T. J. DeVoogd.
A survey of the newly discovered animal models for sex differences in the brain. Topics include the role of steroids in brain development, whether hormones can modify the structure of the adult brain, and the consequences of such sex differences in anatomy for behavior.

PSYC 525 Mathematical Psychology
PSYC 526 Cognitive Neuroscience
PSYC 527 Topics in Biopsychology
PSYC 535 Animal Behavior
PSYC 541 Statistics in Current Psychological Research
PSYC 543 Psychological Tests
PSYC 544 Topics in Psychopathology and Personality
PSYC 551 Distinguished Speakers
PSYC 580 Experimental Social Psychology (also Sociology 580)
PSYC 600 General Research Seminar
Fall or spring. No credit.
PSYC 605 Perception (also Psychology 205)
ARTS AND SCIENCES - 1995-1996

[PSYCH 607] Chemosensory Perception (also Psychology 307)  

[PSYCH 609] Development of Perception (also Psychology 309)  

[PSYCH 611] Human Learning and Memory (also Psychology 311)  
Fall. 4 credits. T R 11:40-12:55. E. S. Spelke.

[PSYCH 612] Laboratory in Cognition and Perception (also Psychology 412)  

[PSYCH 613] Obesity and the Regulation of Body Weight (also Nutritional Sciences 315)  
Spring. 3 credits. Limited to 30 students. Prerequisites: one course in psychology and one course in nutrition. Undergraduate students may register with permission of instructor. S-U grades optional. Offered alternate years. T 1:30-3:30. D. A. Levitsky.

This course is a multidisciplinary discussion of the causes, effects, and treatments of human obesity. Topics include the biopsychology of eating behavior, the genetics of obesity, the role of activity and energy metabolism, psychosocial determinants of obesity, anorexia nervosa, therapy and its effectiveness, and social discrimination.

[PSYCH 614] Issues in Cognitive Psychology (also Psychology 214)  
Fall. 4 credits. M W F 10:10. B. Khurana.

[PSYCH 615] Concepts, Categories, and Word Meaning (also Psychology 415)  
Fall. 4 credits. T 1:25-4:25. F. C. Keil.

[PSYCH 616] Psychology of Music (also Psychology 416)  

[PSYCH 619] Neural Networks Laboratory (also Psychology 419)  

[PSYCH 622] Developmental Biopsychology (also Psychology 422)  

[PSYCH 625] Brain and Behavior (also Psychology 425)  

[PSYCH 626] Evolution of Human Behavior (also Psychology 326)  
Fall. 4 credits. T R 2:55-4:10. R. E. Johnston.

[PSYCH 629] Olfaction and Taste: Structure and Function (also Psychology 429 and BIONB 429)  

[PSYCH 631] Effects of Aging on Sensory and Perceptual Systems (also Psychology 431 and BIONB 421)  
Fall. 4 credits. T R 10:10-11:25. B. P. Halpern.

[PSYCH 632] Biopsychology of Learning and Memory (also Psychology 332 and BIONB 328)  

[PSYCH 640] Sleep and Dreaming (also Psychology 440)  


[PSYCH 650] The Lenses of Gender (also Psychology 450 and Women's Studies 450 and Women's Studies 650)  

[PSYCH 675] Developmental Psychobiology: Motivational Processes (also Psychology 375)  

[PSYCH 676] Motivation (also Psychology 276 and Nutritional Sciences 276)  

[PSYCH 681] Advanced Social Psychology (also Psychology 481)  

[PSYCH 689] Seminar: Beliefs, Attitudes and Ideologies (also Psychology 489)  

[PSYCH 691] Research Methods in Psychology (also Psychology 491)  

[PSYCH 692] Sensory Function (also Psychology 492 and BIONB 492)  

[PSYCH 696] Introduction to Sensory Systems (also Psychology 396 and BIONB 396)  
Spring. 4 credits. M W F 10:10. B. P. Halpern.

[PSYCH 700] Research in Biopsychology  

[PSYCH 709] Developmental Psychology (also Psychology 209)  

[PSYCH 710] Research in Human Experimental Psychology  

[PSYCH 714] Comparative Cognition (also Psychology 414)  
Spring. 4 credits. T R 11:40-12:55. E. S. Spelke.

[PSYCH 715] Psycholinguistics (also Psychology 215)  

[PSYCH 716] Auditory Perception (also Psychology 316)  
Fall. 4 credits. T R 10:10-11:25. C. L. Krumhansl.

[PSYCH 717] The Origins of Thought and Knowledge (also Psychology 417)  

[PSYCH 720] Research in Social Psychology and Personality  

[PSYCH 722] Hormones and Behavior (also Psychology 322 and BIONB 322)  

Fall: R. grade. Spring: S-U only. 4 credits.

The Cognitive Studies Proseminar consists of two semesters of meetings with the graduate faculty in the field of Cognitive Studies. The proseminar will consist of a general introduction to the field of Cognitive Studies including an introduction to each of the major disciplines that make up the minor: i.e., computer science, linguistics, philosophy, and psychology. In each of these disciplines, faculty members from the field will introduce the theoretical and methodological issues that underlie the field and its relation to Cognitive Studies; in addition, they will introduce various labs in which active research is being conducted in their field at Cornell.

The proseminar will include suggestions from faculty in each field for further advanced interdisciplinary research that can be pursued at Cornell during a Cognitive Studies minor. It will conclude (end of second term) with individual student presentations in which students initiate a critique of some interdisciplinary research, after consultation with a faculty member of their choice.

Although suitable to entering graduate students, the proseminar is also open to graduate students between their first and second year. Advanced undergraduates with a Cognitive Studies concentration may also be admitted. This is a year-long lecture and discussion course. The year-long commitment is mandatory. An "R" grade will be assigned in the fall semester, and a S-U grade only will be assigned in the spring semester.

[PSYCH 775] Proseminar in Social Psychology I  
Fall. 2 credits. Limited to 10 graduate students in social psychology. Hours to be arranged. D. A. Dunning, T. D. Gilovich and D. T. Regan.

This is the first term of a year-long discussion-seminar course intended to give graduate students an in-depth understanding of current research and theory in social psychology. The course will emphasize social cognition, but other topics, such as group dynamics, social influence, the social psychology of language, emotional experience, etc., will be covered.

[PSYCH 776] Proseminar in Social Psychology II  
Spring. 2 credits. Limited to 10 graduate students in social psychology. Hours to be arranged. D. A. Dunning, T. D. Gilovich, and D. T. Regan.

This is the second half of a year-long discussion-seminar course intended to give graduate students an in-depth understanding of current research and theory in social psychology. The course will emphasize social...
The major in French is divided into three options: the area studies and literature options are described below. While prospective majors should try to plan their programs as far ahead as possible, especially if they intend to study abroad, no student will be refused admission merely because of a late start. Students wishing to major in French area studies or French literature should consult the director of undergraduate studies of the Department of Romance Studies, Professor Jacques Béraud.

The Literature Option
The major in French, literature option, is designed to give students proficiency in the oral and written language, to acquaint them with French literature and culture, and to develop skills in literary analysis.

Admission
To be admitted to the major, students should have completed French Literature 201, 220, or 221 plus 222 and French Language 213 or its equivalent by the end of their sophomore year.

For completion of the major, a student must:
1. acquire a sound degree of competence in French language. This competence is demonstrated by the successful completion of French 301–312 or their equivalents, such as properly accredited study abroad or the passing of a special language test (the CASE examination) or the permission of the adviser (this option applies only to 312).
2. take six courses in French literature or civilization at the 300 level or above. These courses, selected in consultation with the student’s major adviser, will include at least two pre-19th-century courses and at least one 400-level course.
3. take two connected courses in one of the following related areas: literature, linguistics, comparative literature, history, history of art, music, government or another relevant discipline with a significant French component. Students who are double majors are exempted from this last requirement.

The French Area Studies Option
Admission
To be admitted to the major, students should have completed French Literature 201, 220, 221 or 224 plus French Language 213 or its equivalent by the end of their sophomore year.

For completion of the major, a student must:
1. acquire a sound degree of competence in the French language. This competence is demonstrated by the successful completion of French 301–312 or their equivalents, such as properly accredited study abroad or the passing of a special language test (the CASE examination) or the permission of the adviser (this option applies only to 312).
2. take two courses in Romance Studies (literature or civilization) at the 300 level or above.
3. take six courses in no more than three areas of interest such as—but not limited to—Africana Studies, anthropology, comparative literature, French literature, economics, government, history, history of art, linguistics, music, theater arts, women’s studies at the 300 level or above. Each area must be represented by at least two courses, and each course must have a French component. At least one of these six courses should be at the 400 level.

Religious Studies Major
See "Special Programs and Interdisciplinary Studies."
University of Geneva, where they take year-long courses in conjunction with Swiss students. They can choose classes in many subjects, including literature, economics and other social sciences, law, theology, psychology, education, architecture, physical education, and French language, civilization, and history.

Interested students can participate in internships at international organizations, and qualified participants may be able to work under the direction of officials on research studies that are of mutual interest. Beginning in mid-July, the University of Geneva offers four consecutive three-week language and civilization summer courses which prepare students for their work in the examination given in early October. Cornell students must attend the last of these sessions, from mid-September to early October, but earlier sessions are recommended for students who need additional language preparation.

Students must be Cornell undergraduates with a strong academic record. The minimum French preparation is the completion of French 213 or its equivalent in advanced credit or placement by the Cornell CASE examination. The taking of French 301 and/or 312, however, strongly recommended. Students should plan to study abroad for the entire academic year. Students interested in the study abroad program in Geneva should contact the Cornell Abroad office for further information.

**Honors.** The honors program encourages work outstanding in French literature or culture to do independent work in French outside the structure of courses. The preparation of the senior honors essay, generally spread over two terms, provides a unique learning opportunity, since it allows for wide reading, and extensive rewriting to a degree not possible in the case of course papers.

No special seminars or courses are required of honors students, but they will have regular meetings with the faculty advisers who have agreed to work with them. They may receive course credit by enrolling in French 429-430, but these independent study courses must be taken in addition to the courses that meet the minimum requirements for the major. At the end of the senior year, each honors student is examined orally on the honors essay by a jury consisting of his or her faculty adviser and two other faculty members. The awarding of honors is determined by the student's grades in the major and the quality of the honors essay.

**Fees.** Depending on the course, a small fee may be charged for copies of texts used in course work.

**Language and Linguistics**

Most language courses and French linguistics courses are offered by Modern Languages and Linguistics. Further language courses (conversation and advanced level), French linguistics courses, and all literature courses are listed below.

**Note:** Students placed in the 200-level courses base the option of taking language and/or literature courses under "Literature" for descriptions of the literature courses, any of which may be taken concurrently with French Language 200, 203, 205, or 213 (offered by Modern Languages and Linguistics or Hotel Administration 206).

**FRROM 210 Intermediate French Conversation**

Fall or spring. 2 credits. Limited to 15 students. Prerequisite: French 200, 203, 205 or equivalent (Q++) on the Cornell Advanced Standing Examination (CASE). J. Bereaud and staff. The course is based on audiovisual materials used in class, slides, video strips, and recordings will accompany extensive discussions. A modest amount of reading each week will aim at increasing students' active vocabulary.

**FFROM 301 Advanced French Composition and Conversation I**

Fall or spring. 4 credits. Limited to 15 students. Prerequisite: French 213 or placement by the Cornell Advanced Standing Examination (CASE). Fall: J. Bereaud and staff; spring: S. Tarrow. Class discussions based on reading of selected contemporary texts. Half will be short stories by 20th-century writers, half will be articles on current events taken from French magazines or newspapers. All texts are chosen for thematic or cultural interest and linguistic quality. Special attention will be given to correctness and accuracy in French through grammar review and weekly papers (essays or translations). Two films will be shown to illustrate today's idiomatic language. Course required of French majors. Students who desire to enrich their linguistic and cultural knowledge at this level may take either FRDML 303: French through Current Events or FRDML 305: French through Film before, after, or concurrently with FRROM 301, but no more than two of these three courses may be taken for credit.

**FRFROM 311 Advanced French I**

This course has been renumbered as FRROM 301.

**FRFROM 321 Advanced French Composition and Conversation II**

Spring. 4 credits. Limited to 15 students. Prerequisite: French 310 or Cornell Advanced Standing Examination (CASE) placement of Q++. J. Bereaud and staff. This course is based on discussion of articles published in the French press. A few audio and video recordings and films will also be used.

**FRLIT 220 French and Francophone Culture**

Fall or spring. 3 credits. Prerequisite: CPT score of 600 or French 200, 203 or 205. Conducted in French. Fall: S. Tarrow; spring: J. Ngue. This course serves as an introduction to French Area Studies. It provides an overview of Francophone culture and society from 1945 to the present. Readings will include a selection of articles dealing with issues of current concern in France; works by French and Maghrebine or African writers; poetry or drama; two films will also be discussed.

**FRLIT 221 Modern French Literature**

Fall, spring, or summer. 3 credits. Prerequisites: a CPT score of 600 or French 200, 203 or 205. Conducted in French. J. Ngue and staff. This course, divided into small sections, is intended as a first introduction to French literature, the Modern Period. Texts have been chosen both as a function of their centrality to the traditional literary canon and with an eye to its current transformation. The course focuses on different theoretical approaches to reading literature, without neglecting to situate works in their historical, philosophical, and cultural context. The course considers literary genres (poetry, drama, and the novel) as solicitations to read texts differently, at different speeds, with diverse claims on our attention. It is designed to satisfy a general interest in modern French literature as well as to prepare students to pursue a French major in literature. Readings will include works of authors such as Baudelaire, Beckett, Ionesco, Camus, and Duras.

**FRLIT 222 Early Modern French Literature**

Fall or spring. 3 credits. Prerequisite: French 201, 220, 221 or permission of the instructor. Required of all literature majors, but not limited to them. Conducted in French. P. Lewis and staff. Study of the classical literature of seventeenth-century France (Corneille, Racine, Molière, Mme de Lafayette, La Fontaine) and of eighteenth-century Enlightenment literature (Voltaire, Rousseau, Diderot, Beaumarchais). Special attention is paid to the ways in which these various works represent or deal with the shift from an aristocratic cultural code of values to modern bourgeois ideology and aesthetics. The course will also invite reflection on the status and centrality of
female characters in classical and neo-classical French literature; it will attempt to trace the evolution from the classical tragic heroine, to more modern (but no less problematic) representations of women.

FRLIT 224 The French Experience: An Introduction (also History 220)  
Spring. 5 credits. R. Klein and N. Karwan-Curtis  
An examination of French society, culture, and institutions. What has made French culture so distinctive? Its literature and its revolutions, its gastronomy and fashion, its painting, cathedrals, and cinema. Looking attentively at texts, images, and contexts from selected moments in the eighteenth, nineteenth, and twentieth centuries, we will attempt to unravel some of the defining enigmas of the French experience. Two lectures a week in English and one section (one section conducted in English, one in French). Readings available both in French and in English translation.

FRLIT 320 French Civilization  
Fall. 4 credits. Prerequisite: French 213 or its equivalent. J. Béraud  
Detailed, analytical study of contemporary France. A short historical review will prepare the background for the synchronous exploration of the structure, culture, and attitudes of contemporary French society. In the second part of the course, students will select a topic for in-depth personal research leading to the writing of a term paper. Short oral presentations will be encouraged. Audio-visual materials will be used (current magazines and television excerpts). Three or four films will be shown to illustrate some aspects of French life. Class conducted in French; papers can be in French or in English.

Note: Prerequisite for all 300-Level courses in French literature: French 201, 220, or 221.

FRLIT 329 Francophone Caribbean Literature  
Spring. 4 credits. J. Ngate  
A general introduction to the literature through the reading of representative poems, plays, short stories, and novels by writers such as Jacques Roumain, Aimé Césaire, René Depestre, Maryse Condé, Léon Damas, Myrnam Warner-Vleya, and Bertène Juminer. The course will be taught in French and with student participation in discussion of the assigned texts.

FRLIT 330 Francophone African Literature  
Fall. 4 credits. J. Ngate  
Introduction to the works of representative poets, dramatists, novelists, and short story writers from sub-Saharan Africa and Madagascar. L. S. Senghor, C. Laye, F. Oyono, J.-J. Rabetarivelo, S. Labou Tansi, and the Afro-Caribbean Aimé Césaire will be among the writers whose works will be read. The focus will be on the twentieth century and the nature of these writers' relationships both with the West and with Africa.

FRLIT 334 The Novel as Masterwork (also French Literature 684)  
Spring. 4 credits. Conducted in French. N. Furman  
This course traces the evolution of the nineteenth-century French novel. Readings include novels by Stendhal, Balzac, Flaubert, and Zola.

FRLIT 365 Contemporary Fiction (also Comparative Literature 365)  
Fall. 4 credits. Lectures in English, discussion section in French. D. Grossvogel  
For description, see COM L 365.

FRLIT 369 Comic Theater in the Seventeenth Century  
Spring. 4 credits. P. Lewis  
The principal focus of this course will be the comedies of Corneille and Molière. In addition, there will be an attempt to follow the evolution of a half-century of comic theater (1625 to 1675), with attention to some interesting, if relatively minor, works by Racan, Mairet, Scarron, and Racine. Conducted in French.

FRLIT 383 Lieux de mémoire: les révolutions du 19e siècle  
Fall. 4 credits. Conducted in French. N. Furman  
The historical traumas of the French revolutions of 1789, 1830, 1848, and 1870 and their traces in French literature. Readings will include works by Hugo, Desbordes-Valmore, Balzac, Flaubert, Maupassant, Vallès, and Zola.

FRLIT 406 Alchemy and Abjection in Early Modern Europe (also Society for the Humanities 420)  
Spring. 4 credits. K. Long  
For description, see S HUM 420.

FRLIT 407 The Construction and Critique of the Enlightenment Subject (also Society for the Humanities 407, Comparative Literature 407, and History 407)  
H. Mah  
For description, see S HUM 407.

FRLIT 414 Ethic, Evil, Sexual Difference (also Society for the Humanities 414)  
Spring. 3 credits. Limited to 17 students. J. Copiec  
For description, see S HUM 414.

FRLIT 419-420 Special Topics in French Literature  
419, fall; 420, spring. 2–4 credits each term. Prerequisite: permission of instructor. Staff  
Guided independent study of special topics.

FRLIT 421 Crimes of the Nation and Cinematic Memories (also Society for the Humanities 422)  
Spring. 3 credits. N. Wood  
For description, see S HUM 422.

FRLIT 428 Oulipo: forms of potential literature (also French 698)  
Spring. 4 credits. R. Klein  
"Oulipo (Ouvroir de littérature potentielle)" is a relatively small circle of writers and mathematicians that has been conducting radical experiments in literary form since its beginnings in 1960. Its members are largely but not exclusively French and its meetings are held in Paris. Its aim is to identify and analyze older, even ancient experiments in literary form and to elaborate new formal or textual principles based on novel combinatory or permutations, including computer algorithms. Its founding and continuing members include some of the most prominent contemporary French writers, poets, and novelists, including Raymond Queneau, J.-P. Jouvet, Georges Perec, as well as the Italian writer Italo Calvino and the American Harry Mathews. The course aims principally to examine the theoretical claims of Oulipo, its hostility to surrealism, its voluntarism, its preference for formal constraints, its exemplification of rhetorical and literary procedures (lipograms, palindromes, rhopalic verse, holohyphms, Boolean haikus, etc.). At the same time, close readings of selected texts will be encouraged.

FRLIT 429-430 Honors Work in French  
Fall, 429, spring, 430. Spring. 8 credits year-long course, R grade fall semester, letter grade spring semester, with permission of the adviser. Open to juniors and seniors. Consult the department for honors program. J. Ngate and staff.

FRLIT 447 Medieval Literature  
Fall. 4 credits. Prerequisite: French 221 or permission of instructor. Conducted in English. A. Colby-Hall  
This course is designed to give students facility in reading Old French and an appreciation of two of medieval French literature- the epic and the theater.

FRLIT 475 Exoticism and Eroticism: Figures of the Other in the French Enlightenment  
Fall. 4 credits. A. Berger  
"To study man, it is necessary to learn how to see into the distance. It is necessary to observe differences in order to discover common properties" (Rousseau, Essai sur l'origine des Langues). Imagined or theorized, the exotic experiment helped shape modern and contemporary discourses on the cultural and political community, on universalism and particularism, on diversity and identity. Good savages or bad giants, oriental women or despots, Indians, Zoroastrians, Tahitians, Americans (etc.), through these figures of otherness, thinkers and writers of the Enlightenment grasped at the foreign in the familiar, the same in the different and the desirable in the estranged. For exoticism is always eroticized (thus feminized) as the erotic is orientalized. The other may be less far or further than one thinks. How can one be a Persian (wo)man? (Works studied include Montesquieu, Rousseau, Diderot, de Saint-Pierre). Conducted in French.

FRLIT 491 Georges Bataille  
Spring. 4 credits. Conducted in French. N. Furman  
A major figure of contemporary French thought, Georges Bataille (1897–1962) has written influential works on literature, critical theory, political science, sociology, and philosophy. Readings for this course will include a selection of his essays and several of his novels.

FRLIT 492 Experimentation in Twentieth-Century French Drama  
Fall. 4 credits. Prerequisite: French Literature 221. Conducted in French. D. Grossvogel  
A systematic attempt to analyze the way in which French experimenters changed the traditional forms of theater during this century. These experiments will be examined with reference to a selection of the stage and of drama, including typologies of the sign, codes of communication, and performance, dramatic and paradoxic action, etc.

FRLIT 600 Facing the Other (also Women's Studies 600)  
Fall. 4 credits. N. Furman and A. Berger  
For description, see WOMNS 600.
ITAL 389 Modern Italian Novel (also Italian 689)  
Spring. 4 credits. B. Ballaro.

ITAL 419-420 Special Topics in Italian Literature  
419, fall; 420, spring. 2-4 credits each term. Prerequisite: permission of instructor. Staff.

ITAL 429-430 Honors in Italian Literature  
429 fall; 430, spring. 8 credits. Year-long course. R for fall semester; letter grade for spring semester. Limited to seniors. Prerequisite: permission of instructor. M. Migiel.

ITAL 445 Boccaccio (also Italian 645)  
Spring. 4 credits. M. Migiel.

ITAL 490 Modern Italian Women Writers (also Italian 690)  
Fall. 4 credits. B. Ballaro.

ITAL 689 Modern Italian Novel (also Italian 389)  
Spring. 4 credits. B. Ballaro.

ITAL 690 Modern Italian Women Writers (also Italian 490)  
Fall. 4 credits. B. Ballaro.

Romance Studies

Literature

ROMS 459 Being, God, Mind: Key Terms of Western Thought from Plato to Vico (also Comparative Literature 359)  
Fall. 4 credits. C. Arroyo.

[ROMS 497 Heidegger on Language, Art, and Literature (also Comparative Literature 497)  
4 credits. Not offered 1995-96.]

Spanish


The Major

The major is designed to give students proficiency in the oral and written language, to acquaint them with Hispanic culture, and to develop their skill in literary and linguistic analysis. Satisfactory completion of the major should enable students to meet language and literature requirements for teaching, to continue with graduate work in Spanish or other appropriate disciplines, or to satisfy standards for acceptance into the training programs of the government, social agencies, and business concerns. A Spanish major combined with another discipline may also allow a student to undertake preprofessional training for graduate study in law or medicine. Students interested in a Spanish major are encouraged to seek faculty advice as early as possible. For acceptance into the major, students should consult the director of
undergraduate studies in Spanish—Professor Garces—who will admit them to the major and choose an adviser from the Spanish faculty. Spanish majors will then work out a plan of study in consultation with their advisers. Previous training and interests as well as vocational goals will be taken into account when the student's program of courses is determined.

Spanish 201 and 204 (or equivalent) are prerequisite to entering the major in Spanish. All majors will normally include the following core courses in their programs:

1) Spanish 315–316–318
2) Spanish 311 and 312 (or equivalent)

Spanish majors have great flexibility in devising their programs of study and areas of concentration. Some typical options of the major are:

1) Spanish literature, for which the program of courses includes at least 20 credits of Spanish literature beyond the core courses. Literature majors are strongly urged to include in their programs courses in all the major periods of Hispanic literature.

2) A combination of literature and linguistics.

3) Either of the above options with certain courses in other disciplines counted toward the major. Whichever option a student chooses, he or she is encouraged to enrich the major program by including a variety of courses from related fields or by combining Spanish with related fields such as history, philosophy, sociology, anthropology, art, music, Classics, English, comparative literature, and other foreign languages and literatures. The interdepartmental programs in Latin American Studies and Hispanic American Studies sponsor relevant courses in a variety of areas.

The J. G. White Prize and Scholarships are available annually to students who achieve excellence in Spanish.

For the major in Spanish linguistics, see Modern Languages and Linguistics—Spanish.

Study abroad in Spain. Cornell and the University of Michigan cosponsor an academic year in Spain program. Students enrolled in this program spend the first three weeks before the fall semester begins in a residential college located on the campus of the University of Madrid, where they take a course in Spanish language and contemporary society and take advantage of special lectures and field trips in Madrid and Castile. This course carries three credits. In early October the program moves to Seville, where students enroll in as many regular classes at the University of Seville as their language competency and general education permit. Their academic work is supplemented by courses designed explicitly for the program by Seville faculty, as well as a seminar regularly offered by the program director, who is chosen from the faculty of either Cornell or Michigan. The special courses normally include history of art and architecture, Spanish composition and syntax, and modern Spanish history. In Seville students live with selected families or in a few cases in "colegios mayores." Cornell-Michigan also maintains a center in Seville, which is used by students for special seminars, tutorials, lectures, and informal gatherings.

Applicants are expected to have attained at least proficiency in Spanish prior to departure. Students are strongly encouraged to study abroad for the entire year rather than for one semester. Students interested in the study abroad program should consult with the Cornell Abroad office for further information.

Honors. Honors in Spanish may be achieved by superior students who want to undertake guided independent research and reading in an area of their choice. Students in the senior year select a member of the Spanish faculty to supervise their work and direct the writing of their honors essays (see Spanish 429–430).

Fees. Depending on the course, a small fee may be charged for film use or for copies of texts for course work.

Language

Most language courses and Spanish linguistic courses are offered by Modern Languages and Linguistics. Advanced language courses and all literature courses are listed below.

Note: Students placed in the 200-level courses have the option of taking language and/or literature courses, see listing under Spanish 201 for description of the literature course that may be taken concurrently with the 203–204 (offered by Modern Languages and Linguistics).

SPANR 311 Advanced Composition and Conversation
Fall. 4 credits. Prerequisite: Spanish 204 or 212 or equivalent. M. Stycos and staff. Advanced language skills, developed through reading, grammar review, and intensive practice in speaking, writing, and translation. Analysis of present-day Spanish usage in a wide variety of oral and written texts.

SPANR 312 Advanced Composition and Conversation
Spring. 4 credits. M. Stycos and staff. Readings and class discussion will focus on the stylistic elements. Increased emphasis, through weekly essays, on students' development of an effective Spanish prose style.

Literature

SPANL 201 Introduction to Hispanic American Literature @
Fall or spring. 3 credits. Prerequisite: qualification in Spanish or permission of instructor. The course is divided into small sections and is conducted mainly in Spanish. (Fulfills both the language proficiency requirement and, following a 300-level Spanish literature course, the humanities distribution requirement. The literature course that normally follows Spanish 201 is Spanish 315 or 318.) M. Stycos and staff.

An intermediate reading course designed to improve reading, writing, speaking, and comprehension skills in Spanish through the reading and discussion of contemporary literary works of various genres (narrative prose, drama, poetry) from Spain and Spanish America. Emphasis is placed on the development of fluency in reading and of critical and analytical abilities. The cultural, sociological, and aesthetic implications of texts by authors such as Borges, Cortázar, Fuentes, García Márquez, García Lorca, and Cela are considered.

SPANL 242 Introduction to U.S. Latino Literature (also LSP 240 and English Literature 240)
Fall. 3 credits. B. V. Olguín. For description, see ENGL 240.

SPANL 243 Poetry and Politics in the Americas (also English Literature 243 and LSP 243)
Spring. 3 credits. B. V. Olguín. For description, see ENGL 243.

SPANL 244 Chicanos and Film: Representations of La Raza (also English Literature 242 and LSP 242)
Fall. 4 credits. B. V. Olguín. For description, see ENGL 242.

SPANL 315 Readings in Sixteenth- and Seventeenth-Century Hispanic Literature #
Fall or spring. 4 credits. Prerequisite: Spanish 201, four years of high school Spanish, or permission of instructor. Taught in Spanish. Students are urged to take Spanish Literature 315 or 318 prior to enrollment in this course. M. A. Garcés. Readings and discussion of representative texts of the period from both Spain and her colonies in the New World: Garcilaso de la Vega, Lazarillo de Tormes, San Juan de la Cruz, Cervantes, Lope de Vega, Calderón, and others.

SPANL 316 Readings in Modern Spanish Literature
Fall or spring. 4 credits. Prerequisite: Spanish 201 or 4 years of high school Spanish or permission of instructor. Taught in Spanish. Fall: A. Moncada and J. Kronik; spring: M. Stycos. Readings and discussion of representative texts from Spain from the romantic period to the present. Bécquer, Galdós, Unamuno, García Lorca, Cela, and others.

SPANL 317 Readings in Colonial Spanish-American Literature @ #
Fall. 4 credits. J. Pedra.

Early masterpieces of Spanish American literature from the "chronicles of discovery" to the first novels. The paradoxical relationship between the historical and literary forms, as well as the serious and the humorous contents, that characterizes writing from the journals of Columbus to those of the picaros.

SPANL 318 Readings in Spanish-American Literature @
Fall or spring. 4 credits. Fall: J. Titter; spring: J. Kronik and J. Pedra. Readings and discussion of representative texts of the nineteenth century from Spanish America: Dario, Borges, Vallejo, Paz, Cortázar, García Márquez, and others.
For description, see NES 339.

SPANL 345 Contemporary Spanish-American Novel @
Fall. 4 credits. Prerequisite: Spanish 318 or equivalent. J. Titter.
Reading and discussion of selected works of narrative fiction by today's leading authors: Castellanos, Cortazar, Donoso, Fuentes, Garcia Marquez, Puig, Vargas Llosa, and others. Two abiding concerns will be the way in which history interacts with aesthetic form and the role of the bicultural reader in actualizing the text's potential.

SPANL 348 Cuban Literature @
Spring. 4 credits. J. Piedra.
A panoramic view of Cuban literature and culture from its "national origins" in the seventeenth century to the present. One fourth of the course will be devoted to reading texts from before the twentieth century, particularly anti-slavery and travel literature of the nineteenth century. Beside early and middle twentieth-century masterpieces we will read contemporary texts written within and outside of the Cuban Revolution. The course ends with Cuban-American literature written in English, Spanish, and Spanglish.

SPANL 350 Literature of Conquest (also Spanish Literature 450) @
Spring. 4 credits. M. A. Garcés.
This course examines the cultural and psychological impact of the Encounter on the literatures of sixteenth-century Europe. We will study the response of sixteenth-century European humanists, such as Peter Martyr, Francisco López de Gómara, and Michel de Montaigne to the challenges represented by the New World. At the same time, we will identify nuclear points in the formation of an American discourse through a detailed reading of both European and American texts. Selections include: Christopher Columbus's Diary and letters, and works by Hernán Cortés, Bartolomé de las Casas, Alvar Núñez Cabeza de Vaca, Martín Fernández de Enciso, Tito Cuauhtemoc, Inca Garcilaso de la Vega, Felipe Guaman Poma de Ayala, and Juan Rodríguez Freyle, among others.

Particular attention will be paid to the conversion of European, Nahualt, or Andean world views into an American imagery, one that turns into an increasingly challenging body of discourse in the hands of the native American writers. The course will focus on ideological, rhetorical, and gender questions in sixteenth- and early seventeenth-century texts on America, as well as on the creative transformations between historical and fictional discourses.

SPANL 363 European Novel (also Comparative Literature 363)
Spring. 4 credits. C. Arroyo.
For description, see COM L 363.

SPANL 374 Literature and Culture @
Spring. 4 credits. U. J. DeWinter.
Analysis of Spanish and Latin American fiction as an expression of cultural values, themes, and problems. Novelist, poets, and short story writers include: Azorín, Unamuno, Lorca, Varése, Fuentes, Asturias, Cortázar, and others. Related essays on cultural topics.

SPANL 388 The Novel in Early 20th-Century Spain
Fall. 4 credits. J. Kronik.
Representative prose fiction works by Unamuno, Baroja, Azorín, and Valle-Inclán will be studied in detail as examples of the Spanish manifestation of the artistic revolution at the beginning of the 20th century. Discussion and papers will include issues such as the revolt against realism, the struggle against traditional genre limitations, the search for new narrative forms, the tensions between art and ideology, etc.

SPANL 399 Spanish Film
Fall. 4 credits. Conducted in Spanish. Screenings to be announced. A. Monegal.
Examines the evolution of Spanish cinema since Franco's death in 1975, both from a historical and a cinematic perspective. The focus will be on documentary, fictional, and allegorical reconstructions of the past, and on the images of the new democratic society which illustrate a postmodern aesthetics. Selected films include works by directors who started their careers under the dictatorship (Saura, Erice, Borau), and by members of the younger generation, such as Almodóvar.

SPANL 419-420 Special Topics in Hispanic Literature
419, fall; 420, spring. 2-4 credits each term. Prerequisite: permission of instructor.
Guided independent study of specific topics. For undergraduates interested in special problems not covered in courses.

SPANL 429-430 Honors Work in Hispanic Literature
429, fall; 430, spring. 8 credits. Year-long course. R grade fall semester, letter grade spring semester. Limited to seniors. Prerequisite: permission of instructor. J. Kronik.

SPANL 440 Medieval Spanish Literature #
Fall. 4 credits. Prerequisite: Spanish 315 or equivalent. Taught in Spanish. C. Arroyo.
Reading from Mio Cad i Celéstia. Emphasis on concepts (learned vs. popular, topos vs. personalism, pro-anti-feminism, courtly love) in European perspective. Cultural distance and "assimilation" through reading.

SPANL 450 Literature of Conquest (also Spanish Literature 350) @
Spring. 4 credits. M. A. Garcés.
For description, see SPANL 350.

SPANL 466 Golden Age Spanish Short Fiction #
Fall. 4 credits. M. A. Garcés.
The sixteenth and seventeenth centuries in Spain are marked by artistic productions—both in literature and in the arts—which gave rise to the term "Golden Age." Among these creations stands the novella, a novelty which attained such perfection in the hands of Cervantes that the writer claims, submitting his Novelas ejemplares to an adoring public: "It is true that I am the first to have written novellas in the Castillian language. . . These novels are my own. . . my wit engendered them, my pen gave birth to them, and they are growing up in the arms of the printing press."

Exploring the way in which Cervantes's Novelas challenge the reigning ideology of truth and fiction, this course will also study other short fictions by, for example, lope de Vega, Tirso de Molina, and María de Zayas. Particular attention will be paid to questions of love and gender in these narratives. Above all, we will concentrate on the quest that puts the hero, male or female, on the road to self-discovery.

SPANL 468 Spanish Poetry of the Golden Age #
Spring. 4 credits. Taught in Spanish. C. M. Arroyo.
Readings from Garcia de la Vega to Quevedo. Reflection on Petrarchism, Neo-Platonism, Culto, Conceptivism, classic stereotypes and originality. Poetry and poetic theory; the emergence of the professional writer in Europe.

SPANL 485 The Nineteenth-Century Spanish Novel #
Spring. 4 credits. J. Kronik.
A study of prose fiction written in Spanish during the last third of the nineteenth century, often referred to as the period of "realism." Major novels by Galdós, Clarín, Valera, and Pardo Bazán will be discussed in the light of their narrative techniques and in the context of their social circumstances. The tensions between the artistic imagination and the representation of reality will be considered.

SPANL 639-640 Special Topics in Spanish Literature 639, fall; 640, spring. 2-4 credits each term.

SPANL 692 Borderwork (also Comparative Literature 591)
Spring. 4 credits. D. Castillo.
This course looks at literary works that thematize geographical, cultural, and linguistic borders between a Spanish-speaking and a non-Hispanic culture. Emphasis in the class will be on works written from the Spanish side of the divide: writers like René Marqués, Ana Lydia Vega, José Emilio Pacheco, and Mario Vargas Llosa may be included. We will, however, also look at books written in English, and may include works by writers such as Ruth Behar, Esmeralda Santiago, D. H. Lawrence, or José Antonio Burciaga who reflect upon a border experience from different racial, geographical, social class, and linguistic backgrounds.

SPANL 693 Freud in Latin America @
Fall. 4 credits. J. Piedra.
A selection of basic and less basic Freud for readers applied to Spanish American prose. The main theme will be the implications of the Oedipal complex in the nation-formation mechanism, as exemplified by Spanish American's problematic relationship to Spanish as a Step-Mother Tongue, as well as to European intellectual paternalism and Uncle Sam's critical nepotism as theoretical Big Brothers. Besides the selection of readings from Freud's opus and Freudian-trained Latin American theorists, we will study Spanish-American fiction with an Oedipal theme.
The following courses will satisfy the Freshman writing seminar requirement.

Russian and Soviet Studies Major
See "Special Programs and Interdisciplinary Studies," which follows the department listings.

Russian Literature
P. Carden (director of undergraduate studies, 235 Goldwin Smith Hall, 255-8530), G. Gibian, N. Pollak, S. Senderovich, G. Shapiro.

The Department of Russian Literature offers a variety of courses: some with readings in English translation, others in the original Russian, or both. The connection between Russian history, society, and literature is particularly close, so instruction and discussion in class often include a variety of topics, such as culture and intellectual history, as well as literature. Several courses are interdisciplinarily, cosponsored with the departments of History, Economics, Government, Comparative Literature, etc. Students interested in majoring in Russian and intending to take Russian 121-122 as soon as possible, preferably in their first year, or by their second at the latest. Russian 203-204, offered by the Department of Modern Languages and Linguistics, and Russian 201-202, offered by the Department of Russian Literature, complete basic language instruction and introduce students to literature. A further sequence of literature courses in Russian follows Russian 202.

For further information about courses and majors, see Modern Languages and Linguistics.

RUSSL 103 Freshman Writing Seminar: Classics of Russian Thought and Literature
Fall or spring. 3 credits. Staff.

RUSSL 104 Freshman Writing Seminar: Nineteenth-Century Russian Literary Masterpieces
Fall or spring. 3 credits. Staff.

RUSSL 105 Freshman Writing Seminar: Twentieth-Century Russian Literary Masterpieces
Fall or spring. 3 credits. Staff.

RUSSL 201-202 Readings in Russian Literature 
201, fall; 202, spring. 3 credits each term. Prerequisites: qualification in Russian, 201 is prerequisite to 202. Open to freshmen.

RUSSIAN 471
philosophy, and social thought over the last two hundred years. The course is designed to give undergraduates a broad familiarity with the cultural traditions of the country that plays a major role in the world today. Russian culture will be presented as part of Western civilization with attention given to its distinctive character. The basic texts are literary works of moderate length in English translation.

**RUSSL 331 Introduction to Russian Poetry**

- **Fall. 4 credits.**
- **Prerequisites:** Russian 202 or equivalent and permission of instructor.
- This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. Also open to graduate students. N. Poliak.

A survey of Russian poetry with primary emphasis on the analysis of individual poems by major poets.

**RUSSL 332 Russian Drama and Theatre**

- **Fall. 4 credits.**
- **Not offered 1995-96.**
- S. Senderovich.

Selected topics. Discussion of a number of the most representative Russian plays of the nineteenth and twentieth centuries in chronological order. Introductions to the historical period, cultural atmosphere, literary trends, and crucial moments in the history of the Russian theater will be especially emphasized. Among the works we will study will be Gogol's *Cherry Orchard.*

**RUSSL 333 Twentieth-Century Russian Poetry**

- **Spring. 4 credits.**
- **Not offered 1995-96.**
- N. Poliak.

Close readings of lyrics by major twentieth-century poets. All reading is in Russian. Geared toward undergraduates.

**RUSSL 334 The Russian Short Story**

- **Fall. 4 credits.**
- **Prerequisites:** Russian 202 or equivalent and permission of instructor.
- This course may be counted toward the 12 credits of Russian literature in the original language for the Russian major. Also open to graduate students. Not offered 1995-96. G. Gibian.

A survey of two centuries of Russian story telling. Emphasis on the analysis of individual stories by major writers, on narrative structure, and on related landmarks of Russian literary criticism.

**RUSSL 330 Education and the Philosophical Fantasies**

- **Spring. 4 credits.**
- P. Carden.

A major philosophical tradition has conceived of education as encompassing the whole of our lives. What we should do or be is seen as the result of every choice we make. The whole of our human contacts is understood as a school in which we form ourselves. This all-encompassing vision of education has been embodied in the works of the great philosopher-fantasists who use the forms of fiction to explore fundamental issues of education. In this course we will examine several key philosophical fantasies, among them Plato's *Republic,* Rousseau's *Emile,* and Tolstoy's *War and Peace.* Our aim will be to understand how the discourse on education became a central part of our Western tradition.

**RUSSL 367 The Russian Novel (also Comparative Literature 367)**

- **Fall. 4 credits.**
- Also open to graduate students. Special discussion section for students who read Russian. G. Gibian.

Sentimentalism, Romanticism, Realism, Modernism. Novels and short stories by Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, and others. Readings in English translation.

**RUSSL 368 Soviet Literature from Revolutionary Times to "Glasnost"**

- **Spring. 4 credits.**
- Also open to graduate students. P. Carden.

A survey of Russian literature from the 1920s to the present day focusing on the most important writers and developments. Among the themes to be explored will be Russian Futurism, literature of the Second World War, the "thaw," the rise of the dissident movement and the introduction of "glasnost." Writers include Mayakovsky, Babel, Zamytin, Platonov, Pasternak, Solzhenitsyn and others.

**RUSSL 369 Dostoevsky**

- **Fall. 4 credits.**
- Not offered 1995-96.

Our topic will be the development of a literary tradition from its origins to the time of Dostoevsky. Among the works we will read: Constant's *Phaedrus.*

**RUSSL 370 Chekhov in the Context of Contemporary European Literature and Art**

- **Spring. 4 credits.**
- Not offered 1995-96.
- S. Senderovich.

Reading and discussion of Anton Chekhov's short stories in the context of the European art of the short story and painting of that era. The course is designed for non-specialists as well as literature majors. All reading is in English translation.

**RUSSL 377 Baltic Literature (also German Studies 377)**

- **Fall. 4 credits.**
- Not offered 1995-96.
- I. Ezergaila.

Estonia, Latvia, and Lithuania have created a rich literary tradition since the beginning of a written indigenous culture in the nineteenth century. We will read texts from each of these literatures, selected for their quality, importance, and the availability of acceptable translations, representing, as much as possible, writers from the pre-Soviet independence period, those writing under Soviet rule, and emigres.

**RUSSL 379 The Russian Connection (also Comparative Literature 379)**

- **Spring. 4 credits.**
- Not offered 1995-96.
- P. Carden.

Our topic will be the development of a poetics of intertextual reference in European prose in the course of the 19th century, culminating in two major Russian novels: Tolstoy's *War and Peace* and Dostoevsky's *The Idiot.* Among other works we will read: Constant's *Adolphe,* Stendhal's *Chateaurue de Parma,* and several short works relevant to the theme.

**RUSSL 384 Dialogue in/as Text (also Comparative Literature 384)**

- **Spring. 4 credits.**
- Not offered 1995-96.
- P. Carden.

An examination of the principle of dialogue and dialogism as it appears in fictional discourse. Using the theories of Mikhail Bakhtin as a point of departure, we will examine the use of dialogue as a form of discourse beginning with Plato's *Phaedrus.*

Dostoevsky's novels *Notes from Underground,* *The Possessed,* and *Brothers Karamazov* will be discussed as dialogic, or polyphonic forms of discourse. Finally, we will discuss selected works of Gide, Sartre and Camus, who acknowledged their debt to Dostoevsky, to see if they are indeed polyphonic in structure.

**RUSSL 385 Reading Nabokov (also Comparative Literature 385 and English 379)**

- **Fall. 4 credits.**
- Not offered 1995-96.
- G. Shapiro.

This course offers an exciting trip to the intricate world of Nabokovian fiction. After establishing himself in Europe as a distinguished Russian writer, Nabokov, at the outbreak of WWII, came to the United States where he reestablished himself, this time as an American writer of world renown. In our analysis of the Nabokovian artistic universe, we shall focus on his two splendid achievements as a Russian writer, *The Defense* (1930) and *Despair* (1934) (both in their English form), and then examine the two widely read novels that he wrote in Itahaca while teaching literature at Cornell—*Lolita* (1955) and *Pnin* (1957).

**RUSSL 389 Contemporary Literature in Central and East Europe (also Comparative Literature 388)**

- **Fall. 4 credits.**
- Not offered 1995-96.
- G. Gibian.

The course will study developments in literature (and to some extent in other areas of culture) in Hungary, Poland, Slovakia, the Czech Republic, Croatia, and Serbia in the most recent periods. We shall 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.

**RUSSL 393 Honors Essay Tutorial**

- **Fall and spring. 8 credits.**
- Must be taken in two consecutive semesters in senior year. Credit for the first semester will be awarded upon completion of second semester. For information, please see Director of Undergraduate Studies.

**RUSSL 404 History and Nationality in Russia and Eastern Europe (also S Hum 404)**

- **Fall. 3 credits.**
- Not offered 1995-96.
- G. Gibian.

Ethnicity and nationality appear as the main forces behind the recent dramatic changes in Eastern Europe. The seminar addresses these issues in Russia, Czech Republic, and elsewhere, mainly from a literary perspective and also in the context of rising ethnic and national consciousness throughout the world.

**RUSSL 409 Russian Stilistics**

- **Fall. 4 credits.**
- Also open to graduate students. Prerequisite: three years of Russian. Not offered 1995-96.

A few steps beyond normative grammar. Introduction to the subtleties of idiomatic Russian on the levels of morphology, syntax, vocabulary, and phraseology. Introduction to the genres of live colloquial and written language. Development of writing skills through short assignments and their analyses. Final notions of literary stylistics and their practical application.

**RUSSL 427 Russian Formalism (also Comparative Literature 427)**

- **Fall. 4 credits.**
- N. Poliak.

This is a course on Russian Formalism, a trend in literary interpretation that flourished in the 1910s and the first part of the 1920s. We will read the writings of such scholars as
Tynianov, Eikhenbaum, Shklovsky, and Jakobson, as well as the works they studied. The course provides a historical examination of a school that gave rise to some of the most important movements in twentieth-century Western criticism—and in other disciplines, such as linguistics and anthropology. The course also provides both a look at classics of Russian prose and an approach to literature that has something to offer readers today. No knowledge of Russian is required.

[RUSSL 431 Contemporary Russian Prose]
Spring. 4 credits. Prerequisites: Russian 301–302 or 303–304, and permission of instructor. This course may be counted towards the 12 credits of Russian literature in the original language for the Russian major. Graduate students may audit the course. Not offered 1995–96. Staff.
This course is designed to acquaint students with the way Russian prose has developed during the past forty years. Although the emphasis will be on comprehension of the text, we will also discuss literary structure, modern literary history, social and political problems, and the ways in which life in the Soviet Union is reflected in its literature. Authors to be read include Viktor Nekrasov, Yuri Kazakov, Alexander Solzhenitsyn, Varlam Shalamov, Abram Tertz (Andrei Sinyavsky), Vasili Axyonov, and Tatyana Tolstaya. This course is specifically intended for third- and fourth-year Russian majors.

[RUSSL 432 Pushkin #]
Spring. 4 credits. Prerequisites: Russian 202 or equivalent, and permission of instructor. This course may be counted towards the 12 credits of Russian literature in the original language for the Russian major. Also open to graduate students. S. Senderovich.
Reading in the original language and discussion of selected works by Pushkin: lyrics, narrative poems, and Eugene Onegin.

[RUSSL 491 Reading Course: Russian Literature in the Original Language]
Fall or spring. 1 credit each term. Prerequisite: permission of instructor. Staff.
This course is to be taken in conjunction with any Russian literature course in English translation. Students will receive one credit for reading and discussing works in Russian in addition to their normal course work.

[RUSSL 492 Supervised Reading in Russian Literature and the Arts]
Fall or spring. 1–4 credits each term. Prerequisite: permission of instructor. Staff.

[RUSSL 499 The Avant-Garde in Russian Literature and the Arts]
Spring. 4 credits. Open to any student who has completed RUSSL 202. May be used in satisfaction of the twelve hours of reading in Russian required for the Russian major. Not offered 1995–96.
In this course we will examine closely representative short texts in Russian by such leading figures of the Russian avant-garde as Blok, Bely, Remizov, Mayakovsky, Khlebnikov, Kruchenykh, and Babel. We will also examine related developments in theater, film, and the visual arts.

Graduate Seminars

[RUSSL 603 Graduate Seminar: Neglected Masterpieces of Short Russian Prose]
Nineteenth- and twentieth-century works chosen according to the needs of the students enrolled. Stress on skills useful in teaching Russian literature.

[RUSSL 611 Supervised Reading and Research]
Fall or spring. 2–4 credits. Prerequisite: permission of the department. Staff.

[RUSSL 617-618 Russian Stylistics I and II]

[RUSSL 619 Seventeenth-Century Russian Literature]
Seventeenth-century Russian literature is often studied together with Medieval literature. Is such an arrangement justified, or does seventeenth-century literature have its own problematic that makes it worth studying separately? In scholarship the seventeenth century is referred to as the Age of Baroque. Did Muscovite Russia experience its own Baroque, and if so, what are its unique features? These and other important issues will be addressed in the seminar. In the course of the seminar a variety of concepts, genres, and themes characteristic for the epoch will be discussed. We will read the works of such authors as Simeon Polotsky, Silvester Medvedev, Kariun Istomin, and the archpriest Avvakum.

[RUSSL 620 Twentieth-Century Russian Poetry]
Spring. 4 credits. Open to advanced undergraduates with permission of instructor. Not offered 1995–96. An in-depth study of the writings of selected twentieth-century poets. Authors may include Blok, Mandelstam, Pasternak, Tsvetaeva, and Khlebnikov.

[RUSSL 621 Old Russian Literature]

[RUSSL 622 Eighteenth-Century Literature]
Spring. 4 credits. S. Senderovich.

[RUSSL 624 Russian Romanticism]
A survey of concepts, themes, genres, and main individual contributions in Russian literature of the Age of Romanticism. The Age of Romanticism encompasses the first four decades of the nineteenth century. Zhukovsky, Batishchov, Pushkin, Baratynsky, Gogol, and Lermontov are the major representatives of this style and the most important period of Russian literature. The emphasis is on poetry, its historical and theoretical problems. It was, above all, the golden age of Russian poetry, which prepared and deeply influenced the following age of great Russian prose. Turgenev, Tolstoy, Dostoevsky, and Chekhov are full of allusions to the texts of the golden age and cannot be properly understood without it.

[RUSSL 625 Russian Realism]
Fall. 4 credits. Also open to advanced undergraduates with permission of instructor. Not offered 1995–96. P. Carden.
A study of the development of psychological realism in Russian prose of the nineteenth century, with some attention to the poetic tradition. In addition to reading representative works, we will pay attention to the historical background of the period. We will approach the works through the critical writings of several important theorists, in particular those of Lydia Ginzburg.

[RUSSL 627 Russian Formalism (also Comparative Literature 627)]
Spring. 4 credits. N. Pollak.
See RUSSL 427 for course description.

[RUSSL 630 Gogol]
Fall. 4 credits. Taught in Russian. G. Shapiro.
Gogol’s artistic career from his “Ukrainian” cycles to Dead Souls. We will examine representative works from each of the major divisions of Gogol’s early work, in particular from his cycles Evenings on a Farm near Dikanka and Mirgorod, and will trace the writer’s development toward his magnum opus, Dead Souls. Although some of the readings will be done in English to enable the class to cover a significant amount of material, the class work will be focused on close analysis of the Russian text.

[RUSSL 650 Russian Intellectual History]
Nineteenth- and twentieth-century selected topics. Taught mostly in English.

[RUSSL 671 Seminar in Nineteenth-Century Russian Literature]
Fall. 4 credits. Not offered 1995–96.

[RUSSL 672 Seminar in Twentieth-Century Russian Literature]
Fall. 4 credits. Open to advanced undergraduates. Not offered 1995–96.

[RUSSL 673 The Russian Nabokov]
Fall. 4 credits. Also open to advanced undergraduates. Not offered 1995–96. G. Shapiro.
Vladimir Nabokov wrote much verse, several plays, numerous short stories, and nine novels in Russian before switching to English. He is a major Russian writer of the twentieth century. This seminar will examine his work in the context of modern Russian literature, concentrating in particular on the novels. Knowledge of Russian is highly desirable, but all the works discussed also exist in English translation.

[RUSSL 675 Russian Literature, 1917–1945]
Fall. 4 credits. Not offered 1995–96.
This semester will focus on the achievements of Russian prose between the two World Wars. Among the authors whose works will be closely read and discussed are Khlebnikov, Olesha, Zoshchenko, Ilf and Petrov, Bulgakov, and Nabokov.
The first stirrings of Symbolism were in the through Europe, drawing in England, the mentalities about the nature of art spread crystallized into a new cultural movement, called in some of its aspects the Decadence. RussL 698 Russian Symbolism

RUSSL 698 Russian Symbolism
Fall. 4 credits. Also open to qualified undergraduates with permission of instructor. P. Carden. Around 1886 the trends in French culture represented by Baudelaire and Mallarme crystallized into a new cultural movement, called in some of its aspects the Decadence and in others Symbolism. The new sentiments about the nature of art spread throughout Europe, drawing in England, the Scandinavian countries, Germany, and Russia. The first stirrings of Symbolism were in the ascendant in Russian cultural life and it remained the dominant force until 1910. Our task will be to study the phenomenon of Symbolism as it touched the arts in Russia, including not only literature, but dance, theater, and the visual arts. Because Symbolism was a movement that cut across national boundaries, we will study the seminal works of European art that created the climate in which Russian Symbolism was conceived and came to maturity.

RUSSL 699 Russian Modernism
Spring. 4 credits. Also open to qualified undergraduates with permission of instructor. Not offered 1995-96. P. Carden. We will be investigating the rich and innovative period of the avant-garde in Russia from 1910 to 1925. In addition to examining outstanding works in a variety of forms, we will look at the movements, social context, and ties to the European avant-garde. Among the writers whose works we will examine are Blok, Bely, Mayakovsky, Khlebnikov, Pilnyak and Babel. We will examine theater through the furthest performance piece, "Victory Over the Sun," through Meyerhold's productions of Mayakovsky's plays and other experimental pieces, and through mass spectacles. We will discuss the film theories of Eisenstein and Dziga Vertov and see several of their films. In the visual arts we will be examining the experiments of Larionov and Goncharova, Malevich, Kandinsky, and Tatlin. We will also look at the photomontage of Rodchenko.)

RUSSIAN AND EAST EUROPEAN STUDIES MAJOR
See "Special Programs and Interdisciplinary Studies."

SANSKRIT
See Department of Modern Languages and Linguistics.

SERBO-CROATIAN
See Department of Modern Languages and Linguistics.

SCIENCE AND TECHNOLOGY STUDIES

(History, Philosophy, Sociology, and Politics of Science and Technology)

Science and technology profoundly affect our lives, often in ways we scarcely understand or perceive. The study of their historical formation, their conceptual structure and social organization, and their political and policy implications can yield important insights into the nature of the modern world. Whether one looks at the history of quantum mechanics, the philosophy of evolution, the sociology of laboratory experiments, or the policy options for environmental protection, one learns about science and society by engaging in the study of both. None of the different dimensions of science and technology makes sense on its own; their integration is increasingly necessary in the worlds of research as well as teaching. The Department of Science and Technology Studies provides a focus for such work at Cornell.

The department administers two majors. The major in Science and Technology Studies aims to further students' understanding of the social and cultural meaning of science and technology and their ability to participate meaningfully in policy debates. Students may focus on the historical, philosophical, sociological, or political aspects of science and technology, within an overall plan aimed at providing a full appreciation of the place of science and technology in society. Students in the sciences or engineering also have the option of taking Science and Technology Studies as a minor or double major. Information may be obtained from the undergraduate records office, 275 Clark Hall, (255-0407).

The Biology and Society major is designed for students who desire strong training in biology and who also wish to acquire a background in the social, political, and ethical dimensions of the biological sciences. The undergraduate curriculum in biology and society is a major in the College of Arts and Sciences and in the College of Human Ecology. It is also offered as an optional curriculum for undergraduates entering the General Studies Program of the New York State College of Agriculture and Life Sciences. A full description of the Biology and Society major may be found in the section on Special Programs and Interdisciplinary Studies. Information and application materials may be obtained from the Biology and Society undergraduate records office, 275 Clark Hall (255-0407).

The Science and Technology Studies Major
1. Prerequisites: Students intending to major in Science and Technology Studies will be required to take the following courses before declaration of the major: a) two courses in history, philosophy, sociology, or government. (In choosing these courses students should be attentive to the prerequisites specified for S&T courses they may wish to take later.) These courses cannot be used to fulfill the core or other course requirements for the major; b) the science requirement of the College of Arts and Sciences; c) mathematics or computer science courses in fulfillment of the Group Four distribution requirement.

2. Core Courses: Science and Technology Studies majors will be required to take:
(a) either Science and Technology Studies 250 (Technology in Western Society) or Science and Technology Studies 292 (Science in Western Civilization); and
(b) either Science and Technology Studies 361 (Philosophy of Science: Knowledge and Objectivity) or Science and Technology Studies 389 (Philosophy of Science: Evidence and Explanation); and
(c) either Science and Technology Studies 390 (also Government 308) or Science and Technology Studies 442 (Sociology of Science).
3. Additional Science and Technology Studies Courses: Science and Technology Studies majors will be required to complete at least 4 additional courses in Science and Technology Studies, subject to the following restrictions:
(a) Breadth requirement: At least one course beyond the core courses in each of the three areas of concentration (history, philosophy, and social studies of science and technology);
(b) Depth requirement: At least two courses in one area beyond the core courses and intended for advanced undergraduates or graduate students.
4. Science Requirement: In addition to the science requirement of the College of Arts and Sciences, Science and Technology Studies majors are required to take an additional two semesters of a natural science or engineering (including computer science). Mathematics sufficient to follow the additional science requirement should be completed before undertaking that requirement. Choice of these courses should be made in consultation with the students' major advisers.

Course Offerings
History
Philosophy
Social Studies of Science
Independent Study

History
S&T 253 Agriculture, History, and Society: From Squanto to Biotechnology
Fall. 3 credits. M. W. Rosser.
This course will survey the major themes in the development of agriculture and agrisusiness in the United States in the nineteenth and twentieth centuries. These include particular individuals (such as Liberty Hyde Bailey, Luther Burbank, G. W. Carver, Henry A. Wallace, and Norman Borlaug), the role of government support and institutions (including U.S.D.A. and Cornell), noteworthy
events (the Dust Bowl, World War II, and the environmental movement), and the achievements of the recent Green and "Gene" Revolutions.

S&TS 250 Technology in Western Society (also Electrical Engineering 250)
For description, see ENGRG 250.

S&TS 281 Science in Western Civilization
For description, see HIST 281.

S&TS 282 Science in Western Civilization #
For description, see HIST 282.

S&TS 287 Evolution (also History 287)
For description, see BIO G 207.

S&TS 292 The Electrical and Electronic Revolutions (also Electrical Engineering 292 and Engineering 292)
For description, see Engineering 292.

S&TS 433 Comparative History of Science
A survey of the major scientific institutions in foreign nations, including developing countries. The course covers the period 1660 to the present day and gives some attention to who in each country becomes a scientist, who rises to the top, and who emigrates. Weekly readings and a research paper.

S&TS 444 Historical Issues of Gender and Science (also Women's Studies 444)
One-semester survey of women's role in science and engineering from antiquity to the 1980s, with special emphasis on the United States in the twentieth century. Readings will include biographies and autobiographies of prominent women scientists, educational writings and other primary sources, and recent historical and sociological studies. By the end of the semester, we shall have attained a broad view of the problems that have faced women entering science and those that still remain.

S&TS 447 Seminar in the History of Biology (also Biology and Society 447, History 415, and Biological Sciences 467)
For description see Biology Sci (BIO G) 467.

S&TS 465 Scientific Rhetoric in Historical Perspective (also History 465 and meets with Communication 465)
For description, see History 465.

S&TS 525 Seminar in the History of Technology
Fall. 4 credits. R. Kline.
Exploration of the history of technology in Europe and the United States from the eighteenth century to the present. Typical topics include the industrial revolution in Britain, the emergence of engineering as a profession, military support of technological change, labor and technology, the "incorporation" of science and engineering, technological utopias, cultural myths of engineers and inventors, social aspects of urbanization in the city and on the farm, post-war consumerism, and gender and technology. The interests of students and recent literature in the field will be considered in selecting the topics for the seminar.

S&TS 644 Topics in the History of Women in Science
Fall. 4 credits. Offered odd fall semesters. M. W. Rossiter.
This is a one-semester graduate seminar on selected topics in the history of women and gender in science and technology, covering mostly the U.S. in the 20th century but broadly defined to include earlier periods and other countries. It seeks to acquaint advanced students with some of the best recent literature on this topic and to identify and explore possible new topics. Weekly readings and a research paper.

S&TS 660 Seminar in Historiographical Approaches to Sciences (also History 660)
For description, see History 660.

S&TS 662 Topics in the Scientific Revolution (also History 662)
For description, see HIST 662.

S&TS 667 Seminar in the History of Agricultural Sciences
Fall. 4 credits. Permission of instructor required. Not offered 1995-96.
Weekly readings and a research paper.

S&TS 205 Ethical Issues in Health and Medicine
For description, see B&SOC 205.

S&TS 206 Ethics and the Environment
For description, see B&SOC 206.

S&TS 286 Science and Human Nature
For description, see PHIL 286.

S&TS 351 Philosophy of Science: Knowledge and Objectivity
For description, see PHIL 351.

S&TS 394 Philosophy of Physics
For description, see PHIL 394.

S&TS 461 Problems in the Philosophy of Science (also Science Philosophy 481)
Not offered 1995-96.
For description, see PHIL 481.

S&TS 661 Reason, Truth, and Science
For description, see PHIL 661.

Social Studies of Science

S&TS 114 FWS: Ecology and Social Change (also Biology and Society 114)

S&TS 119 FWS: The History and Politics of Scientific Method
Fall. 3 credits. W. Lynch.
Is there a single "scientific method," discovered in the seventeenth century, which guarantees the progress of science? Or does talk of scientific method serve as a political weapon to brand one's enemies with the charge of irrationality? Early disagreements about the role of experiment and mathematics were often connected with disagreements about politics and religion. An example is the dispute between Thomas Hobbes, who thought politics should look like geometry, and Robert Boyle, who believed that cooperative experimentation was a better model for political life. We will analyze how seventeenth-century writers discussed scientific method in their own language. We will also see how modern historians and philosophers continue to disagree about those writings and their scientific political functions even today.

S&TS 120 FWS: Political Protest and Scientific Practice
Spring. 3 credits. S. Halfon.
Political protest has been increasingly directed toward scientific ideas and practices. In a wide variety of cases involving scientific or technical issues, we have seen citizens challenging the ability of scientists to make the best decisions. Given this trend, how do we understand either scientific expertise or public rationality? Is scientific knowledge flawed or incomplete? Are citizens and activists irrational? Neither of these explanations is wholly satisfying. In this course we will use several case studies to explore how and why citizens challenge the expertise of scientists in particular issues. We will use these studies to raise questions about the nature of science, the purpose of protest, and the outcome of such interactions. The case studies may include, among other, AIDS, Nuclear Power, Bhopal, Genes, The Pill, and "The Gay Gene." The emphasis in this course will be on developing skills in critical thought. We will use numerous writing assignments as both a vehicle for discussion and as a way of exploring and developing ideas. We will explore the role of writing as a creative and constructive process that is crucial to developing critical thinking skills.

S&TS 125 FWS: Science on Stage: Dramatic Representations of Science, Technology and Medicine
Spring. 3 credits. A. Damoff.
This course examines how science and scientists have been portrayed in twentieth-century drama. In looking at representations of science, the class will address distinctions frequently made between "pure" and "applied" research and the impacts of changing structures for funding science, technology, and medicine. We will ask how non-scientists perceive the integration of science and medicine into the cold-war state. Other major themes include the moral responsibility of scientists for the short-term and long-term products of their research and the educational and critical role of theater in the twentieth century. Initial writing assignments will focus on close readings of individual texts, while papers later in the term will require students to adopt a more comparative framework in looking at two or more of the texts assigned for class discussion.

S&TS 127 FWS: Habeas Corpus: Presenting the Body
Fall. 3 credits. M. Patton.
It would seem that anyone owning a body—everyone—should be qualified to write on it and about it. Historically, this has not been the case. As a culture we have granted special privilege to certain groups of people—doctors, scientists, philosophers, even tattoo artists—to describe the human body for us. This course looks at the construction of the body in relation to writing by following two lines of inquiry. First, we will explore various ways that the body has been constructed in historical and contemporary genres of writing to ask questions about how it has been defined by different writers; how these different versions of "the body" have been
made to seem the same across time; why the body is a crucial, interesting topic for so many writers; and what is at stake in creating a written account of the human body. Second, we will ask how this special authority to write about the body is constructed, challenged, and resisted by various authors. Readings include work from the history of science, cultural history, and feminist theory as well as fiction, legal, scientific, and medical texts from the seventeenth century to today.

S&TS 350 Atomic Consequences: The Incompatibility of Nuclear Weapons in Postwar America (also Government 305)
Spring. 4 credits. M. Dennis.
In addition to class meetings, there is also a required screening session on W 7-10 p.m. in Ursi media room b. Films will generally last less than two hours, but some are longer. Viewing the movies is an essential part of the course. This course will explicate the development of atomic weapons from early twentieth-century ruminations about super bombs in science fiction through the Manhattan Project, the postwar development of thermonuclear weapons and civil defense, and more recent plans for strategic defense. Our focus will expand to cover the lives of researchers at such institutions as Los Alamos during and after World War II as well as discussions of national politics. Other topics include the Nazi effort to develop an atomic bomb, the role of technical espionage during and after World War II, and the problems posed by the classification of technical knowledge. We will seek to understand how the bomb became part of American culture through the use of literature and film, as well as readings in primary historical documents and secondary analyses.

S&TS 352 Science Writing for the Mass Media
For description, see COMM 352.

S&TS 360 Ethical Issues in Engineering
For description, see ENGR 360.

S&TS 390 Science in the American Polity, 1800-1960 (also Government 308)
Fall. 4 credits. M. Dennis.
How did America become a leading nation in scientific and technical research? This course charts the development of American science from its origins in gentlemanly societies in the early nineteenth century through the development of large-scale federally funded research or Big Science. Particular attention will be paid to the importance of government patronage in creating new social and intellectual spaces for research; the importance of medicine and the biomedical disciplines for the development of university-based research; the origins and expansion of research in corporations; and the role of war in the political economy of American science.

S&TS 391 Science in the American Polity, 1960-No (also Government 309)
Spring. 4 credits. M. Dennis.
This course reviews the changing political relations between science, technology and the state in America from 1960 to the present. It focuses on the politics of choices involving science and technology in a variety of institutional settings, from Congress to courts and regulatory agencies. The tensions and contradictions between the concepts of science as an autonomous republic and as just another special interest provide the central theme for the course. Topics addressed will include research funding, technological controversies, scientific advice, citizen participation in science policy, and the use of experts in courts.

S&TS 400 Components and Systems: Engineering In a Social Context
Not offered 1995-96.
For description, see MCAE 400.

S&TS 401 Biology and Society: The Social Construction of Life (also Biological Sciences 301)
For description, see B&ISOC 301.

S&TS 402 Investigative Research on the Social Impact of Science (also Biology and Society 300, Textiles and Apparel 301)
Spring. 4 credits. Prerequisite: one year of science and permission of the instructor. Offered alternate years. Limited to 12.

Taylor
Students choose a current issue in the social impact of biological or physical sciences and work through the steps of investigation from issue definition to spoken presentations and proposals for action. Students comment on and learn from each other's projects and discuss case studies and articles, with occasional guest speakers and films.

S&TS 406 Biotechnology and Law (also Biology and Society 406)
Fall. 4 credits. Limited to 16 students. Recommended: a course in genetics or rDNA, a course in American government or law, or permission of instructor. Fee for course reading material. Not offered 1995-96. S. Jasanoj.
Biotechnology, with myriad applications in areas such as medicine and agriculture, is developing more rapidly than the social institutions that are capable of controlling it. This course explores the use and potential abuse of biotechnology in areas such as genetic screening and counseling, reproductive technologies, intentional release of genetically engineered organisms, patents, and ownership of human tissue. Particular attention will be given to evolving legal and management strategies for regulating the applications of biotechnology. Readings are from science, medicine, law, and public policy. A research paper is required.

S&TS 407 Law, Science and Public Values (also Government 407 and Biology and Society 407)
Fall. 4 credits. Not offered 1995-96.
S. Jasanoj.
This course explores the varied interactions between science and the legal process that have developed over recent years as a result of attempts to bring greater public accountability to the use of science and technology. It examines the activities of both legislatures and courts in controlling science and analyzes the values underlying these initiatives. Three major types of science-law interactions form the focus of the course: expert testimony in the courtroom, regulation of hazardous technologies, and the control of professional standards in science and medicine. Specific topics include the regulation of toxic chemicals and nuclear power, controversies about biotechnology, reproductive technologies and medical research, and scientific misconduct.

S&TS 412 The Politics of the Human Body
Spring. 3 credits. Not offered 1995-96.
Staff.
This course discusses the political character of scientific and technological interventions in the human body. We will examine the history of the control of sexuality and reproduction and then focus on the following intersections between politics, body, gender and technology: contraception, AIDS, in vitro fertilization, abortion, embry research, prenatal screening, gene therapy, and birth technologies. Students will be encouraged to do small fieldwork projects based on interviews and written sources.

S&TS 425 Global and Domestic Dimensions of Science and Technology Policy (also Government 488)
Fall. 4 credits. Not offered 1995-96.

S&TS 427 Politics of Environmental Protection in America (also Government 427)
Fall. 4 credits. Not offered 1995-96.
S. Jasanoj.
An introduction to the distinctive feature of environmental protection in America, focusing particularly on the role of law, science, and citizen activism in public policymaking. Readings from law, political science, and policy analysis will examine the changing role of expert agencies, courts, public interest groups, Congress, and the states in environmental politics since the late 1960s. Case studies of specific environmental controversies (nuclear power, siting, pesticides, endangered species) will be used to explore dominant public conceptions of risk and safety, regulatory costs and benefits, and the goals and instruments of environmental policy.

S&TS 431 Introduction to Science and Technology Policy (also Government 401)
Fall. 4 credits. Not offered 1995-96.
Staff.

S&TS 442 The Sociology of Science (also City and Regional Planning 442 and Biology and Society 342)
Spring. 4 credits. T. J. Pinch.
A view of science less as an autonomous activity than as a social institution. We will discuss such issues as controversies in science, analysis of scientific text, gender and the social shaping of scientific knowledge.

S&TS 465 Scientific Rhetoric in Historical Perspective (also History 465 and Communication 465)
Not offered 1995-96.
For description, see HIST 465.

S&TS 466 Public Communication of Science and Technology
Not offered 1995-96.
For description, see COMM 466.

S&TS 467 Innovation: Theory and Policy
Fall 4 credits. Open to upper-level undergraduates and interested graduate students. Prerequisite: Economics 102 or permission of the instructor. J. Reppy.
In this course we will study the innovation process (that is, the introduction of new technology into practice) through the critical analysis of selected theories of innovation and supporting empirical evidence. Economic theories will be contrasted to the insights to be found in science and technology studies.
The focus will be on the context of interests and ideology in which the various theories have been framed and their differing implications for technology policy. Authors to be covered include Schumpeter, Solow, Scherer, Nelson and Winters and Bijker and Pinch.

S&Ts 469 Food, Agriculture, and Society (also Biology and Society 469)
For description, see BIO G 469.

S&Ts 483 The Military and New Technology
For description, see GOVT 483.

S&Ts 490 The Integrity of Scientific Practice
Fall. 4 credits. S. Hilgartner.
Recent scandals over scientific fraud, debates about financial conflicts of interest, disputes about the use of human and animal subjects, and tensions over ownership of data have raised concern about integrity in science. In addition, changes in the American research system—from the emergence of new university-industry relationships to the growth of electronic communication—pose new questions about who owns and controls research. This course addresses practices that present problems of integrity in research (e.g., fraud, secrecy, commercialization). It also examines how scientific practices affect the structural integrity of science as an institution. Through these complementary concepts of integrity, the course explores the connections between the conduct of science and its cultural authority.

S&Ts 503 Professional Practice in Engineering
For description, see CEE 503.

S&Ts 532 Inside Technology: The Social Construction of Technology
Spring. 4 credits. T. J. Pinch.
Rather than analyze the social impact of technology upon society, in this course we will investigate how society gets inside technology. In other words, is it possible that the very design of technologies embody assumptions about the nature of society? And, if so, are alternative technologies possible which embody different assumptions about society? Do engineers have implicit theories about society? Is technology gendered? How can we understand the interaction of society and technology? Throughout the course the arguments will be illustrated by detailed examinations of particular technologies, such as the ballistic missile, the bicycle, the electric car, and the refrigerator.

S&Ts 626 Workshop on Law, Science, and Technology (also Government 626)
S. Jasanoff.
Legal proceedings provide a powerful mechanism for deconstructing, and to some extent reconstructing, a society's understanding about the nature and social role of expertise, the boundaries of science and technology, and the meaning or validity of scientific "facts." Using a combination of primary legal materials and theoretical studies in science and technology, this course will explore how varying scientific realities are constructed in legal forums and what impact these constructions have on the social relations of science and technology. The course will also consider the policy implications of conflicting legal and scientific approaches to the discovery and verification of scientific facts.

S&Ts 627 Comparative Methods in Policy Analysis (also Government 627)
Fall. 4 credits. Not offered 1995–96.
S. Jasanoff.
Comparisons, at levels of analysis ranging from individual biographies to national decisionmaking, have emerged as an important methodological approach in policy analysis. Focusing primarily on historical and social studies of science and technology, this course seeks to enhance the student's ability to carry out effective comparative analyses at a variety of research sites including laboratories, regulatory agencies, and new social movements. Work in structuralist as well as post-structuralist idioms will be examined in order to sharpen and refine notions such as national styles and political culture that have loomed large in the comparative literature on the politics of science and technology. Topical areas include military research, biotechnology, and environment controversy.

S&Ts 631 Qualitative Research Methods for Studying Science
Spring. 4 credits. T. J. Pinch.
Much has been learned about the nature of science by sociologists and anthropologists who have studied the actions of scientists in action. In this course we will look at the methods used in this new wave of science studies. We will examine what can be learned by interviewing scientists, from video and from detailed examinations of scientific texts. Students will gain hands-on experience by conducting a mini-project in which they investigate some aspect of scientific culture.

S&Ts 645 Genetic Engineering: Politics and Society in Comparative Perspective (also Government 634)
Spring. 4 credits. Prerequisite: permission for upper-level undergraduates. S. Hilgartner.
Since its development, genetic engineering has been a passionately debated technology, creating high hopes for some and deep anxieties for others. This course will trace the conflicts and power struggles over genetic engineering from its origins to the present. We will use genetic engineering as a case to discuss some crucial issues in the relationships among science, technology, and politics: the political shaping of modern biology; the relationship between eugenics and molecular biology; the regulation of risks; the state and modern biotechnology; university-industry relationships; agriculture medicine; and biotechnology, the rise of bioethics; social movements, Green parties and technology, the socioeconomic impacts of genetic engineering, the Third World and biotechnology; and the politics of the Human Genome Project. We discuss how society deals with high-impact technologies and explore the question of the adequacy of the political-legal framework of contemporary "risk society."

S&Ts 660 Social Analysis of Ecological Change (also Biology and Society 460 and Rural Sociology 660)
Fall. 4 credits. Prerequisite: one year of science. Limited to 20 graduate students and seniors with permission of instructor. Offered alternate years. P. J. Taylor.
Scientific studies of ecological and social processes, together with interpretation of those studies by historians, sociologists, and anthropologists. Topics include ideas of nature, colonial conservation science, systems ecology, the tragedy of the commons, neo-Malthusianism, human ecology, local knowledge, nomadic pastoralism, political ecology, women and eco-development, and global environmental discourse.

S&Ts 662 Science and Social Theory
Spring. 4 credits. Prerequisite: S&Ts 442 or permission of the instructor. Limited to 15 students. P. J. Taylor.
Issues in social theory, or more broadly, social thought, raised by scientific and technological studies of science and technology. Focal theme for Spring 1996: Agency and Structure—connecting individual action to social structure/diness and the related problem of connecting micro and macro levels of analysis.

S&Ts 688 International Environmental Policy (also Government 687)
S. Jasanoff.
This course examines the emergence of the environment as an important item on the political agendas of nations and the evolution of national and international policy responses to environmental issues. Analytically, the course attempts to define the distinctive characteristics of environmental policy and politics in our time and to identify the factors that promote convergences and divergences among different national approaches to the same environmental problems. The scope of the course is therefore both cross-national and international, embracing developing as well as industrialized countries. Particular attention is given to the role of legal and scientific institutions, processes, and instruments in the resolution of environmental controversies. Among the specific issues to be considered are chemical control, global warming, export of hazards, stratospheric ozone depletion, and global climate change.

S&Ts 711 Introductory Seminar in Science and Technology Studies
Fall. 2 credits. S–U grades only. Incoming S&Ts graduate students must take this course.
This introductory course is designed for incoming graduate students and will run as a weekly seminar. It will serve as a forum for discussion of the main perspectives and approaches in S&Ts and introduced by current departmental faculty. Every week a different S&Ts faculty member will introduce a discussion of one of their own pieces of writing. It is expected that all members of the seminar will have read the piece beforehand. One faculty member will be appointed to coordinate the seminar. Other interested faculty and graduate students are encouraged to attend. The seminar will be pass/fail only for two credits. A pass will be awarded to students who satisfactorily attend and participate in the seminar.

S&Ts 751 Ethical Issues and Professional Responsibilities (also Toxicology 751)
For description, see BIOBM 751.
Independent Study

S&TS 299 Undergraduate Independent Study
Fall or spring. 1–4 credits. Please apply in 275 Clark Hall.

S&TS 699 Graduate Independent Study
Fall or spring. 2–4 credits. Please apply in 275 Clark Hall.

S&TS 700 Special Topics
Spring. 4 credits.

Biology and Society Major

The biology and society major is ideally suited for students who wish to combine training in biology with exposure to perspectives from the social sciences and humanities on the social, political, and ethical aspects of modern biology. In addition to providing foundational training in basic biology, biology and society students obtain background in the social dimensions of modern biology and in the biological dimensions of contemporary social issues.

The biology and society major is offered to students enrolled in the College of Arts and Sciences or the College of Human Ecology. Undergraduates in the College of Agriculture and Life Sciences can develop an approved sequence of courses from the biology and society curriculum under general studies. The major is coordinated for students in all colleges through the biology and society office. Students can get information, specific course requirements, and application procedures for the major from the office in 275 Clark Hall, 255-6042.

A detailed listing of Biology and Society course offerings can be found in the Courses of Study section entitled Special Programs and Interdisciplinary Studies.

Concentration in Science and Technology Studies

S. Jasano, chair; R. Boyd, Philosophy; P. Dear, History; M. A. Dennis, Science and Technology Studies; M. Kline, Electrical Engineering; B. Lewenstein, Communications; W. R. Lynn, Civil and Environmental Engineering; R. Miller, Philosophy; P. Moen, Sociology; B. Cohen, Computer Science; D. B. Stark, Social Psychology; J. M. Styczynski, Sociology; H. A. Walker, R. M. Williams, Jr.

The subject matter of sociology is human social organization and institutions. The Department of Sociology offers courses in social organization that include (among other issues) examination of inequality on the basis of race, ethnicity, income, and occupation; political behavior and public policy; social psychology and group processes; and contemporary social movements for change. Courses that analyze institutions include the family, politics and issues of public policy, the analysis of voluntary organizations, and the study of networks of political and organizational action.

The Department of Sociology offers the opportunity to develop fundamental theoretical insight and advanced research skills appropriate for professional social behavior and institutions. Graduates of the department take up careers in university, government, and business settings and in law, management, architecture, and other professions seeking men and women who demonstrate a disciplined understanding of society and social issues.

Sociology Courses for Nonmajors

Sociology provides students with particularly effective ways to understand the complexities of modern life. For many students, the undergraduate years are a last opportunity to gain the insights these fields have to offer. The Department of Sociology is continuing to design an array of beginning and advanced courses that convey a broad understanding of the methods and insights of sociological analysis—courses that will be of particular interest to undergraduates who may not major in sociology. First- and second-year students should note that introductory courses (101, 103, 110, 115) provide substantial focus on the sociological analysis of major issues of public life. A wide selection of general education courses is available at the 200 level. Advanced undergraduates who are majors in other fields should also see, in particular, the descriptions of Sociology 303, 340, 354, for which there are no prerequisites other than junior or senior status.

Related Courses in Other Departments

Students interested in sociology should consult the course lists of the other social science departments in the College of Arts and Sciences (including Anthropology, Economics, Government, and Psychology) and of other departments: Organizational Behavior (College of Industrial and Labor Relations), Human Development and Family Studies (College of Human Ecology), and Rural Sociology (College of Agriculture and Life Sciences).

The Major

Requirements for general sociology: (1) 101 and any other 100-level or 200-level course (excluding Freshman Writing Seminar) with a 2.5 minimum grade-point average; (2) no later than the junior year, the 301 and 303 methods courses; (3) one course in the department at the 400 level or higher (491 is recommended); and (4) 20 additional credits in sociology, of which 5 may be taken in related departments if approved by the student's adviser.

Requirements for honors: Potential honor students are encouraged to begin taking the methods and statistics courses during their sophomore year and to take at least 2 credits of Sociology 491, Independent Study, during their junior year. Honors students must take Sociology 495–496 during their senior year. Graduation with honors requires a cumulative average of at least B+ in all sociology courses and the successful completion of an oral defense of the honors thesis. Interested students should consult the director of undergraduate studies no later than the second semester of the junior year.

Cornell-in-Washington program. Qualified sociology majors may include a semester in the Cornell-in-Washington program, in which students take courses and undertake a closely supervised internship. For further information, see p. 19.

Supervised research. Qualified sociology majors are invited to participate with faculty members in conducting research. Such projects are usually initiated in one of two ways: the student may offer to assist the faculty member in an ongoing project, or the student may request that the faculty member supervise the execution of a project conceived by the student. In either case the student should enroll in Sociology 491. Interested students may direct inquiries to any faculty member.

Society and Economy Concentration

Sociology majors or students in other disciplines who wish to prepare for graduate study in any of the social sciences or in a profession (business, management, or law) may elect to acquire a concentration in society and economy (including international dimensions). This program is designed to provide training in economic sociology, formal organizations, and social science methods.

The requirements for the concentration in society and economy include courses in economic sociology, formal organizations, and methods. For further information, consult Professor Victor Nee, 330 Uris Hall.
Introductory Courses

SOC 101 Introduction to Sociology
Fall and spring. 3 credits. Fall, S. B. Coddall; spring, V. G. Nee.
This course provides an introduction to theory and research in sociology. It demonstrates how the insights, theories, and methods of sociological analysis can be brought to bear on major issues of social life. A primary goal is to convey a sense of the manner in which sociologists formulate theories and how the collection and analysis of data are used to evaluate those theories. The course will provide "hands-on" experience in analyzing sociological issues. Students undertake guided research exercises that involve using computers to analyze actual data. No prior background is presumed; necessary skills are covered in class and section meetings.

SOC 103 Introduction to Sociology: Microsociology
Fall. 3 credits. D. P. Hayes.
An introduction to microsociology, focusing on social processes within small groups, including the analysis of leadership, conformity, social influence, cooperation and competition, distributive justice, and micro analyses of interaction.

[SOC 110 Introduction to Economy and Society]
Modern social thought arose out of attempts to explain the relationship between economic development and the social transformations that gave rise to the contemporary world. Classical theorists from Karl Marx and Max Weber to Karl Polanyi focused their writings on emergent economies and societies. Contemporary social theorists likewise have sought to understand the interaction between capitalism and the social forces reacting against and emerging from modern economic development. From exchange and rational choice theories to network analysis and institutional theory, a central theme in contemporary social thought has been the relationship between the economy as a social system, economic action and social structure, rationality and fundamental social processes. This course provides an introduction to social thought and research seeking to understand and explain the relationship between economy and society in the modern era.

[SOC 115 Utopia in Theory and Practice]
This course examines imaginations of the "ideal society" and efforts to realize them. We discuss the classic literary utopias, from Plato's Republic to More's Utopia to Bellamy's Looking Backward, and also the dystopias of Huxley and Orwell. We also examine social experiments like the nineteenth-century American intentional communities, various socialisms, and the design of contemporary political constitutions. Throughout, the emphasis is on two sociological questions: What leads people to conceive of particular social arrangements as ideal? How can we tell social structures that can work from those that cannot?

[SOC 204 Race and Ethnic Relations]
This course focuses on race and ethnic relations in contemporary perspective. It examines the social and behavioral implications of attributions of race and ethnicity in small group interaction, the world of work, and the larger society. Topics: inequalities in income and employment, affirmative action, ethnic political mobilization, patterns of marriage and family formation.

General Education Courses

SOC 215 Organizations: An Introduction
Fall. 3 credits. S. Han.
This is an introductory course in the study of organizations. We will start by taking a look at various examples of organizing, including a street gang in Brooklyn, General von Moltke's Prussian army, a government agency, and an industrial corporation. These brief glimpses serve as exercises in looking behind and beyond diverse rhetoric for common patterns in organizational phenomena. We will consider these both from the inside and outside perspectives. The focus of the course is upon research scholarship, not the training of managers. Notably the analytical skills you will acquire are applicable to work in firms, government agencies, and nonprofit organizations.

[SOC 222 Social Policy and Organization in Health, Education, and Welfare]
Introduces the development of three central kinds of social policy: those concerned with delivering medical care, schooling the young, and providing resources for the economically vulnerable. The course treats the historical development of large-scale public programs, regulatory systems, or attempts to stimulate provide action; political struggles over social rights and the allocation of resources; and the organizations that are constructed to carry out policy. The focus is on American policy, but with considerable comparative attention to the health, education, and welfare programs of other nations.

[SOC 230 Knowlege and Power]
Modernity will be studied in this course by examining dual aspects of the rationalization of power 1) as attempts to bring ever-larger spheres of social action under rationalized control, and 2) as the production of rationalized justifications by which power is represented and legitimated. These processes will be examined in three historical settings: Frederick Winslow Taylor's schemes of "scientific management" at the turn of the century in the United States; the Leninist project of "scientific socialism" in Eastern Europe; and the International Monetary Fund's current project of "scientific capitalism" in contemporary post-socialist societies. Our century begins and ends with blueprints for making capitalism—bureaucratic and in Taylor's project was attempted in the microsphere at the level of the firm, current recipes for "scientific management" at the turn of the century in the United States; the Leninist project of "scientific socialism" in Eastern Europe; and the International Monetary Fund's current project of "scientific capitalism" in contemporary post-socialist societies. Our century begins and ends with blueprints for making capitalism—bureaucratic and in Taylor's project was attempted in the microsphere at the level of the firm, current recipes for...
from both developed and developing societies. Specific topics will include sex differences in pay and sex segregation in the labor force, theoretical explanations from national and ethnic feminism, the relationship between women's paid and unpaid labor, and the role of the state and government policy.

**SOC 283 Groups and Relationships (also Psychology 283)**
Spring. 4 credits. S. Kanazawa. We will tackle the mysteries of human behavior and pursue a single question throughout this course: Why do human beings behave the way they do? We will first discuss several celebrated examples of seemingly unusual and bizarre behavior and then try to explain these with the help of selected social psychological theories: behaviorism, attribution theory, exchange theory and game theory. The emphasis will be on the application of the theories to explain empirical examples of human behavior.

**SOC 290 Social Psychology of Interpersonal Relations**
3 credits. Not offered 1995-96. H. A. Walker. The focus of this course is on the relationship between the individual and the social group. It will examine the way in which the individual shapes "society," and in turn, how society influences individual behavior. Topics include formation of self, influence and conformity, and the emergence of racial and gender differences in status and power.

**Methods and Statistics Courses**

**SOC 301 Evaluating Statistical Evidence**
Fall. 3 credits. R. L. Breiger. A first course in statistical evidence in the social sciences, with emphasis on statistical inference and multiple regression models. Theory is supplemented with numerous applications.

**SOC 303 Design and Measurement**
Spring. 4 credits. Prerequisite: a course in sociology. D. P. Hayes. Foundations of sociological analysis; issues arising from using humans as data sources, the quality of data; methods of its collection; research designs in wide use and their limitations; pragmatic considerations in doing research on humans, organizations, communities, and nations.

**Intermediate Courses**

**SOC 315 Business Organization for the 1990s**
Spring. 4 credits. D. Strang. In the last two decades, American business organizations have undergone a revolution in form and process. Corporate downsizing has changed the face of American management, and altered white-collar career paths. Large bureaucratic organizations are giving way to smaller firms that develop complex relations with each other rather than building from within. Japanese organizational styles and organizational reform strategies like Total Quality Management have become the buzzwords of the 1980s and 1990s. This course discusses the new forms of business organization (and their manifestation in other domains, such as education and healthcare) that mark a crucial shift in the world of work and the way it shapes people's lives.

**SOC 340 Health, Behavior, and Health Policy**
Spring. 3 credits. S. B. Caldwell. This course examines the social contexts of physical and mental health, illness and medical care; its purpose is to explore the contributions of social science to health promotion and health policy. Topic areas include: social context of health, disease and illness; social organization of health services; use of health services; effectiveness of health service use; health promotion and disease prevention; and national health care policies.

**SOC 345 Gender Inequality**
3 credits. Not offered 1995-96. E. Bell. Gender inequality in contemporary perspective; emphasis on social origins of gender categories and implications of gender status for collective and individual behavior. Topics include inequalities in interpersonal relations, the family and work organizations, and implications of gender inequality for family violence, sexual harassment, and rape.

**SOC 350 Comparative Revolutions**
For description, see GOVT 350.

**SOC 354 Law and the Social Order**
Spring. 3 credits. R. L. Breiger. In what ways do legal and institutional social systems of discipline and control function to maintain order? How do legal institutions deal with conflicts of law, race, gender, and ethnicity? Do legal institutions maintain social stability? How does the social context of law and legal systems function to maintain social order?

**SOC 370 Different Walks of Life: Sociology of Careers**
Spring. 4 credits. S. Han. By examining various career paths, we will consider the implications of career as a continuous process or as a sequence of positions. We will explore the differences and similarities among different career paths and lay out the patterns and structures of the career formation from a sociological point of view. We will also discuss the settings in which these careers take place, giving some comparative attention to the ways of organizing careers in other societies.

**SOC 380 Gender, Ideology, and Culture**
Spring. 4 credits. P. Becker. This course will explore representations of women in popular culture, including images, narratives, and religious practices. We will examine the relationship between popular culture and ideology, and look at how women "read" popular culture. The aim of the course is to enable students to think critically and analyze the effects of ideological representations on the construction of personal identity and society.

**SOC 383 Immigration and Ethnic Identity**
Spring. 4 credits. V. G. Nee. Immigration has been a central process in the peopling of American society. The early immigration to the New World primarily involved primarily the migration and settlement of European national groups. Since 1965, the mix of immigration has shifted to include increasing diversity of ethnic groups, especially from Latin America and Asia. As American society moves into an era of increasing ethnic diversity, the issue of ethnic boundaries and identity become increasingly complex and problematic. This course seeks to examine the characteristics of international migration, the dynamics of immigrant incorporation into American society, and the making of new ethnic groups and identities.
SOCIOMETRY 401

SOC 444 Contemporary Research in Social Stratification
Stratification and mobility as paired concepts, requiring mutual articulation. The interplay of structure (occupational groups, labor markets, organizational demes, social classes) and process (tracking, career trajectories, socioeconomic attainment). Recently formulated log-linear models of mobility and structure provide a central focus of the course.

SOC 491 Independent Study
Fall or spring. 1-4 credits. For undergraduate who wish to obtain research experience or to do extensive reading on a special topic. Permission to enroll for independent study will be granted only to students who present an acceptable prospectus and secure agreement of a faculty member to serve as supervisor for the project throughout the term. Graduate students should enroll in 891-892.

SOC 495 Honors Research
Fall or spring. 4 credits. Limited to sociology majors in their senior year. Prerequisite: permission of instructor.

SOC 496 Honors Thesis: Senior Year
Fall or spring. 4 credits. Prerequisite: Sociology 495.

SOC 497 Social Relations Seminar (also Anthropology 495)
Spring. 4 credits. Limited to seniors majoring in social relations.

Graduate Core Courses
These courses are primarily for graduate students in sociology but may be taken by other graduate students with permission of the instructor. Graduate students in sociology will normally take each of the five courses listed below, but with the concurrence of their special committees other arrangements may be made.

SOC 501 Basic Problems in Sociology I
Fall. 4 credits. V. G. New.
Analysis of theory in current sociological research. Examination of several central problems in sociological inquiry provides an occasion for understanding tensions and continuities between classical and contemporary approaches, for indicating the prospects for unifying microsociological and macro sociological orientations, and for developing a critical appreciation of efforts to integrate theory and research.

SOC 502 Basic Problems in Sociology II
Spring. 4 credits. R. L. Breiger.
Continuation of Sociology 501. Emphasis is on the logical analysis of theoretical perspectives, theories, and theoretical research programs shaping current sociological research. The course includes an introduction to basic concepts used in the logical analysis of theories and examines their application to specific theories and theoretical research programs. Strategies include functionalism, social exchange, and interactionism.

SOC 505 Research Methods I: Logic of Social Inference
Fall. 4 credits. Prerequisite: a first course in statistics and probability. S. B. Caldwell. This course is an introduction to techniques of social inference. We will cover research methods, sources of evidence, model design, and questions of empirical validity.

SOC 506 Research Methods in Sociology II
Spring. 4 credits. Prerequisite: Sociology 420 or 505 or equivalent. Offered Spring 1997.
A survey of methods for analyzing sociological data, including measurement error models, confirmatory factor analysis, panel models, and general structural equation methods. Readings from the sociological research literature will illustrate various methods. Periodic assignments on micro and mainframe computers will integrate theory, method, and data.

SOC 507 Research Methods in Sociology III
Fall. 4 credits. Prerequisite: Sociology 506. D. Strang.
Models and methods for the analysis of social dynamics. The course presents discrete-time methods for the analysis of time series and longitudinal data.

Graduate Seminars
These seminars are primarily for graduate students but may be taken by qualified advanced undergraduates who have permission of the instructor. Which seminars are to be offered any term is determined in part by the interests of the students, but it is unlikely that any seminar will be offered more frequently than every other year. The list below indicates seminars that are likely to be offered in 1991-92, but others may be added and some may be deleted. Students should check with the department before each term.

SOC 508 Qualitative Methods
Spring. 4 credits. P. Becker.
This introductory graduate course will cover a range of qualitative methods, from fieldwork to cultural/interpretive methods. The course is designed to give students an introduction to a range of methods and techniques. Students will be required to engage in an ongoing research project on which they will report periodically throughout the course of the semester, in class discussions and in short papers that concentrate on solving concrete research problems.

[SOC 510 Comparative Societal Analysis
Fall. 4 credits. Offered 1996-97. D. Stark.
This course examines contending analytic strategies for comparing institutions (and institutional configurations) across societies and social systems. How, for example, does the institutional analysis of the socialist economy contribute to our understanding of the specificities of modern capitalism? Special emphasis will be given to comparing transitions from state socialism (in Eastern Europe and elsewhere) with transitions from authoritarianism in Latin America and Southern Europe.

[SOC 513 Social Networks and Social Structure
A critical survey of theories and techniques of structural analysis in sociology, centering on the usefulness of social network analysis in providing integration of studies at different levels of generality. Study of the areas of the sociology of organizations, community studies, social stratification, and dependence relations among nations. Emphasis on the mutual relevance of theories and operational research procedures.

[SOC 524 Rational Choice Theory
Rational choice perspective has gained popularity in all social sciences. The main focus in this course will be sociological rational choice, although we will discuss the work of economists, political scientists, psychologists, and others where relevant. We will first discuss the foundations of rational choice as a macro-sociological perspective, and emphasize the deductive derivation of various rational choice theories from this perspective. We will discuss the pioneering work of Coleman Hechter and Willer as well as the more recent work by Beckathom, Macy, Jasso, and others. We may have some guest speakers to talk about their current research.

[SOC 526 Social Policy (also SOC 426)

SOC 530 Social Organization of Economic Action
Fall. 4 credits. S. Han.
The issue of organizational boundary has been a central concern for both organizational sociology and economic sociology. The seminar approaches the issue, although it covers many other relevant literatures, mainly by playing two lines of argument against each other: transaction cost economics and transfer pricing problem. Meta-analytic techniques are also introduced, which are to be used for the final team project reviewing the empirical research on vertical integration.

SOC 565 Experimental Method in Social Sciences
Spring. 4 credits. S. Kanazawa.
We will discuss laboratory experiments, not as a mere psychological research method to study human behavior, but as a means of testing scientific theories of micro (individuals, groups and organizations), and macro (societal phenomena). The emphasis will be on the philosophical foundations and justifications for laboratory experiments (including the issues of internal and external validity, and artificiality and realism) rather than the detailed how-to instructions or statistical techniques of data analysis. We will read actual experimental studies, representing various designs, and discuss some ethical and other concerns in conducting laboratory experiments with human subjects.

[SOC 583 Transitions to Market Economies in Eastern Europe (also Management 583)
This course examines the problems and prospects of transitions to markets in Eastern Europe. It introduces concepts for understanding the state socialist economy that is being transformed and analyzes important political developments since 1988.
include privatization, joint ventures, new capital markets, entrepreneurship, and labor relations in these changing economies.

**SOC 591 Special Seminars in Sociology**
Fall and spring. 2-4 credits.
These graduate seminars will be offered irregularly. Topics, credit, and instructors will vary from semester to semester. Students should look at the sociology department bulletin board at the beginning of each semester for possible offerings.

**SOC 606-607 Sociology Colloquium**
Fall and spring. No credit. Required of all sociology graduate students. A series of talks representative of current research interests in sociology, given by distinguished visitors and faculty members.

**SOC 608 Proseminar in Sociology**
Fall. One credit. Enrollment restricted to first-semester sociology graduate students. Discussions on the current state of sociology and on the research interests of the members of the field, given by members of the field.

**SOC 660 Social Movements**
For description, see GOVT 660.

**SOC 683 Social Interaction (also Psychology 683)**
Spring. 4 credits. D. P. Hayes. Seminar: topic to be announced.

**SOC 891-892 Graduate Research**
891, fall; 892, spring. Up to 4 credits each term, to be arranged. Prerequisite: graduate status and permission of a faculty member willing to supervise the project.

**SOC 895-896 Thesis Research**
895, fall; 896, spring. Up to 6 credits each term, to be arranged. Prerequisite: permission of thesis director.

**Related Courses**
HDPS 655 Age and the Life Course P. Moen.

**SPANISH LANGUAGE**
See Department of Modern Languages and Linguistics.

**SPANISH LITERATURE**
See Department of Romance Studies.

**SWAHILI**
See Africana Studies and Research Center.

**SWEDISH**
See Department of Modern Languages and Linguistics.

**TAGALOG**
See Department of Modern Languages and Linguistics.

**TAMIL**
See Department of Modern Languages and Linguistics.

**THAI**
See Department of Modern Languages and Linguistics.

**THEATRE ARTS**

**Theatre, Film, and Dance**
Through its courses and production laboratories, the department provides students with a wide range of opportunities in theatre, dance, and film. It offers a theatre arts major with concentration in theatre or film and a major in dance. These majors educate students in accordance with the general liberal arts ethic of the college. The programs in dance and film and the advanced undergraduate theatre program give some measure of professional preparation in those arts as well. The department encourages academic and studio participation by students from all disciplines and also provides the Cornell community with an opportunity to take part in its productions on an extracurricular basis.

**Theatre Arts Major**

**Theatre Concentration**
The theatre concentration offers students in the history of theatre, dramatic theory and criticism, playwriting, acting, directing, design/technology, and stage management.

**Course requirements for theatre concentration:**

<table>
<thead>
<tr>
<th>Course Requirement</th>
<th>Credits</th>
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<tbody>
<tr>
<td><strong>THETR 240 and THETR 241</strong> (two-semester introduction to theatre)</td>
<td>8</td>
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<tr>
<td><strong>THETR 250 Introduction to Theatre Design and Technology</strong></td>
<td>4</td>
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<tr>
<td><strong>THETR 280 Introduction to Acting</strong></td>
<td>3</td>
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<tr>
<td><strong>THETR 151 Production Lab I</strong></td>
<td>1-3</td>
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<tr>
<td><strong>THETR 153, THETR 253, or THETR 353 Stage Management Lab I, II, or III</strong></td>
<td>1-3</td>
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<tr>
<td><strong>THETR 355 Rehearsal and Performance or THETR 151 in a different area</strong></td>
<td>1-3</td>
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<tr>
<td><strong>THETR 251 or THETR 351 Production Lab II or III</strong></td>
<td>1-4</td>
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3) Four courses in the area of **Theatre Studies** (see Theatre Studies section of theatre courses) chosen in the following manner:
- one course must be at 300 level
- one course must be at 400 level
- two additional courses at the 300 or above level
- one of the four courses must be pre-twentieth century.

4) Three courses (at least 9 credits) in other Theatre Arts courses chosen in consultation with the faculty advisor. Course taken to qualify for admission to the Advanced Undergraduate Theatre Program (described below) may also be used to fulfill this requirement.

5) Courses in which a student receives a grade below "C" cannot be used to fulfill the requirements for a Theatre Arts major.

**The Advanced Undergraduate Theatre Program**
The department offers advanced study in acting, directing, playwriting, design/technology, and stage management to students who qualify on the basis of outstanding achievement in course work. Criteria for admission to the AUTP is by the completion of the appropriate "track" of courses or equivalent experience and invitation of the faculty. Approval process will include a portfolio review and/or interview. The program provides students with intensive study in theatre as well as the opportunity to collaborate with professional faculty and guest artists. Department productions will be chosen to offer a unique experience to the individual student selected for the program. (For specific requirements please see listing of courses at end of department listings.)

**Film**
The study of film began in this department in the 1930s and continues to be based here. In the interim years, however, it has also spread into a significant number of other departments in the college: Africana studies, anthropology, Asian studies, comparative literature, English, German studies, history, psychology, and romance studies. This proliferation of courses has been accompanied by a comparable proliferation of perspectives and faculty concerns, e.g., the relationship of national cinemas to national literatures and specific cultures, film's relationships to myth and ideology, the use of film as historical evidence, film's efficacy as a rhetorical medium, and film's contribution to perennial issues in aesthetics, the history of the arts, and studies in cognition.

This richness of courses and perspectives is matched by the ways in which students may make film the focus of their undergraduate studies. The four ways currently being used are as follows: 1) concentrating on film within a Theatre Arts major; 2) constructing an individually tailored Independent Major in film (including the possibility of placing film in tandem with another medium or discipline); 3) focusing on film as a College Scholar; and 4) concentrating in Visual Studies. Students interested in option 4 should consult Marilyn Rivchin (Theatre Arts) and/or Robert Ascher (Anthropology). Students interested in options 2 or 3 should consult Don Fredericksen (Theatre Arts) and Lynne Abel (director, College Scholar and Independent Major programs). Students interested in the first option should first consult Alison Van Dyke (director, Undergraduate Studies, Theatre Arts) and then one of the department's film faculty.
Film Concentration Requirements
The department's film concentration requires a total of 50 credits in film and related courses. Students should note that a number of film courses—including two required "core" courses: Theatre Arts 375 and 376—are offered in alternating years. This means that students cannot fulfill the requirements for the major in less than two years, and that they should plan accordingly, in consultation with their major adviser. Within the "core" required courses, Theatre Arts 274, Introduction to Film Analysis, should be taken during the sophomore year.

Majors wishing to utilize the production courses in a substantial manner must plan carefully and work within certain limits. These courses are: Theatre Arts 277, 377, 383, 413, 477, 493 and 563. Enrollment in each of these courses is limited by the nature of the work and by facilities. Enrollment in Theatre Arts 477 and 493 depends upon the quality of previous work in Theatre Arts 277, 377, 383 and/or 413; enrollment is not guaranteed. Majors without a strong interest in production can complete the production requirement with one course: Theatre Arts 277. Majors with a strong interest in production should begin instead with Theatre Arts 377, after they have taken Theatre Arts 274 in their sophomore year. The total credits in production courses cannot exceed twenty hours; this limit is strictly enforced.

1. A core of four film courses:
   - THETR 274 Introduction to Film Analysis
   - THETR 375 History and Theory of Commercial Narrative Film (offered alternate years)
   - THETR 376 History and Theory of Documentary and Experimental Film (offered alternate years)
   - THETR 277 Video Production I (offered alternate years, and summers)
   OR
   - THETR 377 Fundamentals of 16mm Filmmaking

2. One of the following theatre courses:
   - THETR 250 Fundamentals of Theatre Design/Technology
   - THETR 280 Introduction to Acting
   - THETR 398 Directing I (prerequisite: THETR 280)

3. Four courses (15–16 credits) in film offered by Theatre Arts as below, or by other departments (with consent of adviser):
   - THETR 290 Filming Other Cultures
   - THETR 315 Japanese and Asian Film
   - THETR 378 Soviet Film of 20s and French Film of 60s (offered alternate years)
   - THETR 379 Documentary Film from 1945 to present (offered alternate years)
   - THETR 383 Screenwriting
   - THETR 395 Video: Art, Theory, Politics
   - THETR 396 German Film (offered occasionally)
   - SPAN 399 Spanish Film (requires fluency in Spanish)

   THETR 413 Film and Performance
   ASARC 435 African Cinema
   THETR 475 Seminar in the Cinema I (offered alternate years)
   THETR 476 Seminar in the Cinema II (offered alternate years)
   THETR 477 Intermediate Film and Video Projects
   THETR 493 Advanced Film and Video Projects
   THETR 653 Myth onto Film

4. 15 credits of related coursework outside of Theatre Arts or approved by adviser. These courses chosen to fulfill this requirement should reinforce the student's particular interest in film, and will not necessarily be film courses per se. For example, a student interested in the psychology of film, or in ethnographic film, or in film vis-a-vis intellectual or social history, will be encouraged to choose "related course work" accordingly.

5. With a grade of less than C, a course cannot be used toward the concentration.

6. Course work in production cannot exceed twenty credit hours.

Film Study Abroad
The College of Arts and Sciences, through this department and in consort with a number of other colleges and universities, offers up to a full year of study at the Inter-University Center for Film and Critical Studies in Paris, France. The center's program is theoretical, critical, and historical. It is most useful to students pursuing a major in film studies and serves as an intensive supplement to their Cornell film courses. Fluency in French is required, and Theatre Arts 274 and 375 are prerequisites. Inquiries should be addressed to Professor Fredericksen, Cornell's liaison with the center.

The Dance Program
The dance program offers courses in dance technique, improvisation, composition, performance, and the history and the culture of dance. Technique courses include modern dance at four levels and ballet at three levels. Other dance forms, such as tap, historical dances, Japanese Kabuki, Native American, and African dance are offered on a rotating basis. Courses in jazz and ballroom dance, taken through the Physical Education program, supplement these offerings. Technique classes develop strength, flexibility, coordination, and the ability to perceive and reproduce phrases of dance movement with clarity of rhythm, body design, and expression. The more advanced courses require the ability to perform complex phrases in various styles. Students may earn up to eight academic credits (one each semester) in technique classes. Students may also satisfy the physical education requirement by taking dance technique courses as part of the dance program. The schedule for all dance technique classes is available in the main office of the Center for Theatre Arts. Registration for technique classes takes place in Treagle Hall. Students taking technique for academic credit must also register through their own colleges.

The faculty offer rehearsal and performance workshops in which they choreograph and rehearse original dances, performed in public.
This course will explore the history and short dramatic scene.

We will trace the history of pessimism and existential despair in Hollywood from the "40s to the present day and explore the limits of the genre film noir. Readings will include the novels of Raymond Chandler and James M. Cain. Films will include Hawks' *The Big Sleep*, Curtiz' *Mildred Pierce*, Wilder's *Double Indemnity*, Dmytryk's *Murder My Sweet*, Polanski's *Chinatown*, and Scott's *Blade Runner*. Screenings will be Wednesdays 5-7 p.m.

**THETR 120 The Wild Ones: Rebellious Youth on Stage**

Fall and spring. 3 credits. R. Bechtel. Throughout history, in many of the world's most controversial dramatic texts, playwrights have thrust young people onto the center stage. The scenes of rebellion and rebirth enacted in the theatre have often reflected similar upheavals in the society and culture of the time. This course will approach such plays and films as *Natural Born Killers*, *Oliver!*, *Spring Awakening*, and *Hamlet* as fractious cultural critiques, narratives of both rebellious youth and rebellious dramatists. Some of the contemporary cultural issues the course will explore through the plays are political correctness, violence in the media, and multiculturalism. Writing assignments will include play analyses, film reviews, and a short dramatic scene.

**THETR 130 Schwarzenegger and Shakespeare**

Fall and spring. 3 credits. L. Shafer. The performances of Arnold Schwarzenegger's almost un-real body and the "body" of work we know as Shakespeare create an exciting intersection of British Renaissance and American mass cultures. In this course we will explore theatre of representation and cultural politics through investigations of action films, body-building culture, the theatre and film industries, as well as through more formal questions of theatrical and literary form as they are performed in Shakespeare's plays and the history of their reception in both theatrical and academic circles. Can we separate these men and their work from their roles as characters in popular and academic cultures, or do the distinctions between playwright, character, actor, text, and performance collapse in the (easily recognizable) face of these two super-bodies? Close readings of various Shakespeare plays and Schwarzenegger films will raise vital social and cultural questions while offering us access to a greater scholarly understanding of dramatic forms.

**THETR 150 Disney's America**

Fall and spring. 3 credits. M. Leon. This course will explore the history and practices of America's best-loved, least-avoidable cultural giant: Disney. Through films and readings (sorry, no field trips), we will navigate the complex discipline of cultural studies by examining the "Disney Version" of classical literature, the structure and meaning of its theme parks, the multiple interpretations of Disney's corporate history, and the impact of their worldwide ventures. We will also take a look at the current controversies surrounding their proposed historical theme park, "Disney's America."

**GENERAL SURVEY COURSES**

**THETR 230 Creating Theatre**

Spring. 3 credits. Not offered 1995-96. Next offered 1996-97. K. Goetz and faculty. An introduction to the collaborative art of theatrical production. Students will examine the creation of theatre onstage and backstage through lectures, demonstrations, discussions with various faculty and staff at the Center for Theatre Arts, and by attending department productions. Students will explore theories of theatrical and literary form and will work to create the study of elements of theatrical production will help students gain a new critical perspective of the performing arts. Some writing is required.

**THETR 301 Mind and Memory: Explorations of Creativity in the Arts and Sciences (also English 301)**

Spring. 4 credits. Limited to 40 students. For description, see English 301.

**THETR 417 Digital Culture (also Society for the Humanities 417)**

Spring. 3 credits. Limited to 17 students. D. Rodowick. For description, see Society for the Humanities 417.

**THETR 430 Introduction to Theatre Management**

Spring. 4 credits. Limited to 15 students. Not offered 1995-96. Next offered 1996-97. J. E. Gainor. This class is designed to introduce students to the profession of theatre management. The class will be comprised of components of the field, such as marketing, fundraising, contracts, organization structures, personnel management, accounting, and box office. The class will use the work of the Center for Theatre Arts as a case study, and faculty and staff of the Department of Theatre Arts will lead sessions on the various topic areas.

**THEATRE STUDIES COURSES**

**THETR 223 The Comic Theater (also Comparative Literature 223 and Classics 223)**

Spring and summer. 3 credits. J. Rusten. For description, see Classics 223.

**THETR 240 Introduction to Western Theatre I**

Fall. 4 credits. K. Tancheva. A survey of the major developments in the theatre—playwriting, acting, staging, architecture, and dramaturgy—in classical Greece and Rome, medieval and Renaissance Europe. Representative plays will be read and discussed in their theatrical context.

**THETR 241 Introduction to Western Theatre II**

Spring. 4 credits. K. Tancheva. A survey of the major developments in the theatre—playwriting, acting, staging, architecture, and dramaturgy—since 1642. Among the areas considered will be French and Italian Romantic theatre, the nineteenth century in England, France, and Germany, and the modern international stage. Representative plays will be read and discussed in their theatrical context.

**THETR 331 The Classical Theatre (also Comparative Literature 331)**

4 credits. Prerequisite: THETR 240 or permission of instructor. Not offered 1995-96. Next offered 1997-98. Staff. This course will look at the major developments in Classical Greek and Roman theatre as well as possible assessments in the light of contemporary theory. Topics may include one or more of the following: the relation of the dramatic festivals to questions of democracy, the links between the *Poetics* and subsequent criticism, and more recent critical approaches to the dramatic texts.

**THETR 332 Medieval and Renaissance Theatre (also Comparative Literature 332)**

4 credits. Prerequisites: THETR 240 or permission of instructor. Not offered 1995-96. Next offered 1997-98. Staff. Besides the discussion of representative plays from these periods, this class will focus on questions such as the nature of medieval drama, the relation between the church and the community, and the ways in which historians and critics have interpreted the Renaissance, especially in light of Shakespeare's work. Representative plays of class, race, and gender on stage as well as in the audience will also be examined.

**THETR 333 European Drama from the Neo-Classical to the Bourgeois (also Comparative Literature 333)**

Spring. 4 credits. Prerequisite: THETR 240 or 241. J. Devenyi. The course will examine the explosion of dramatic forms and theories in pre- and post-revolutionary Europe. The class will also discuss the ways in which changes in theatre architecture and dramatic structure participate in the dynamics of change in European society that operates between the early eighteenth and the mid-nineteenth centuries.

**THETR 335 The Modern and Contemporary Theatre (also Comparative Literature 337)**

Spring. 4 credits. Prerequisite: THETR 240 or permission of instructor. J. E. Gainor. A study of the drama and its cultural contexts from the late nineteenth century to the present. This course will raise questions about modern as well as postmodern theories of performance and the role of theatre in society. It may also examine western style theatre in non-western settings.

**THETR 336 American Drama and Theatre (also English 336)**


**THETR 337 Contemporary American Theatre (also English 337)**

THETR 338 Introduction to Performance Studies (also Society for the Humanities 410)
Fall. 4 credits. D. Wilcox.
An introductory survey of the development of the discipline. Performance Studies embraces a range of theatrical and para-theatrical activity explored through a range of methodologies, including anthropology, history, and cultural studies.

THETR 372 English Drama to 1700 (also English 372)
Fall. 4 credits. S. McMillin.
See English 372 for description.

THETR 373 English Drama from 1700 to the Present (also English 373)
See English 373 for description.

THETR 431 Theory of the Theatre and Drama (also Comparative Literature 431)
4 credits. Prerequisite: some theatre history and dramatic literature work at the 300 level or permission of instructor. Not offered 1995-96. Next offered 1996-97. A study of major theories of theatrical representation from Aristotle to the present.

THETR 432 Dramaturgy: Play and Period (also Comparative Literature 443)
Inventing the Modern Drama. European theatre between 1870 and 1900.

THETR 435 Special Topics: Theories of Contemporary Performance (also Comparative Literature 436)
Spring. 4 credits. Limited to 15 students. Prerequisite: permission of instructor. J. Devenyi.
A survey of the dramatic literature and the current performance traditions of contemporary France.

THETR 436 The Female Dramatic Tradition (also Women's Studies 433)
Spring. 4 credits. J. E. Gainor.
Is there a "female dramaturgy"? What is the female tradition in the theatre? The course will explore these questions through an investigation of texts by women dramatists, including Hrotsvitha, Aphra Behn, and Caryl Churchill, as well as theory by such critics as Sue Ellen Case and Jill Dolan.

THETR 437 Seminar in Dramatic Criticism (also Theatre Arts 636)
4 credits. Prerequisite: open to qualified junior and senior departmental majors with permission of the instructor. Not offered 1995-96. Next offered 1997-98. Staff.

THETR 438 East and West German Drama
This course will cover the major historical and textual developments in German theatre from the end of World War II to the present. Leading dramatists from West and East Germany, Switzerland, and Austria (Brecht, Frisch, Durrenmatt, Weiss, Hochhuth, Muller, Braun, Kroetz, Handke, and others) will be treated in the light of the political events and aesthetic-dramaturgical traditions from which they emerge and with which they are taking issue.

THETR 440 Visual Perception in the Art of the Theatre (also Theatre Arts 640 and Society for the Humanities 423)
Spring. 4 credits. Prerequisite: permission of instructor. D. Wilcox.
Using a broad range of material including semiotics, philosophy, cognitive psychology, art criticism, and phenomenology, this course is designed to examine the process of seeing theatre as it relates to language, images, memory and perception.

THETR 470 The Japanese Noh Theater and Modern Dramatists (also Asian Studies 470 and Comparative Literature 470)
Fall. 4 credits. Alternates with THETR 471. K. Brazell.
For description, see Asian Studies 470.

THETR 471 Japanese Theatre (also Asian Studies 471)
For description, see Asian Studies 471.

THETR 600 Proseminar in Theatre Studies
Spring. 4 credits. Limited to Theatre Arts students. Prerequisite: permission of the instructor. D. Wilcox.
An introduction to the theory and methods involved in the study of the theatre as cultural and aesthetic practice.

THETR 630 Special Topics (also Comparative Literature 632)

THETR 633 Seminar in Theatre History (also Comparative Literature 634)

THETR 636 Seminar in Dramatic Criticism (also Theatre Arts 437)

THETR 640 Visual Perception in the Art of the Theatre (also Theatre Arts 440 and Society for the Humanities 423)
Spring. 4 credits. Prerequisite: permission of the instructor. D. Wilcox.
For description, see THETR 440.

THETR 648 East and West German Drama: Post-1945 (also German Studies 438)
This course will cover the major historical and textual developments in German theatre from the end of World War II to the present. Leading dramatists from West and East Germany, Switzerland, and Austria (Brecht, Frisch, Durrenmatt, Weiss, Hochhuth, Muller, Braun, Kroetz, Handke, and others) will be treated in the light of the political events and aesthetic-dramaturgical traditions from which they emerge and with which they are taking issue.

THETR 660 Visual Ideology (also Comparative Literature 660 and German Studies 660)
Spring. 4 credits. G. Waite.
For description, see German Studies 660.

THETR 678 Post-Structuralist Dramatic Theory (also Comparative Literature 678)
This course will investigate trends in dramatic theory since structuralism and discuss their application to dramatic texts and performance from various periods.

THETR 679 Bertolt Brecht in Context (also German Studies 679 and Comparative Literature 679)
Brecht's theory and dramatic praxis will be examined in the light of a two-fold contexts: (1) the relation of selected plays and writings to the historical contingencies of the Weimar and exile periods in which they emerged; (2) in later periods - an analysis of the reception and various readings (postmodern, feminism, post-structuralism) of these same works by later writers and critical publics in Germany and the United States as a way of understanding the pragmatic and aesthetic values in the postwar period. Special attention will be given to the importance of Marxism for Brecht's art, as well as to the author's role as a representative of the cultural avant-garde.

THETR 692 The Politics of Criticism (also Comparative Literature 692 and German Studies 692)
See German Studies for description.

ACTING
THETR 155 Rehearsal and Performance
Fall or spring. 1-2 credits. 1 credit per production experience per term up to 2 credits per term. Students must register for the course in the term in which credit is earned; requests for retroactive credit will not be honored. Limited to students who are assigned roles after tryouts at the department's scheduled auditions. Students should add this course only after they have been assigned roles. S-U grades only.

The study, development, and performance of roles in departmental theatre or dance productions or the study and practice of directing as experienced in assisting faculty and guest directors.

THETR 205 Rehearsal Workshop
Fall or spring. 2 credits. Limited to 30 students. Prerequisite: participation in a particular department production; and by permission. D. Feldshuh.
This course will enable students participating in a particular production to gain expertise and/or knowledge to contribute to that production. The focus of the class will depend on the needs of a particular production (history, choreography, textwork, dramaturgy, etc). The class allows students in a production to focus intensely on a particular aspect of that production in a non-pressurized learning environment.
ARTS AND SCIENCES - 1995-1996

THETR 280 Introduction to Acting
Fall or spring. 3 credits. Each section is limited to 16 students. Registration only through roster in the department office, Center for Theatre Arts. A. VanDyke and staff.

An introduction to the actor's technique and performance skills, exploring the elements necessary to begin training as an actor, i.e., observation, concentration, and imagination. Focus will be on physical and vocal exercises, improvisation, and text and character. There is required play reading, play attendance, and some scene study.

THETR 281 Acting I
Fall or spring. 3 credits. Each section is limited to 14 students. Prerequisites: THETR 280 and audition. Registration only through roster in department office, the Center for Theatre Arts. 281 is restricted to sophomores and above. A. VanDyke and staff. Practical exploration of the actor's craft through improvisation and exercises in physical and psychological action. Scene study utilizing the plays of Williams, Inge, and Miller.

THETR 283 Voice and Speech for Performance

THETR 284 Speech and Dialects for Performance
Spring. 3 credits. Limited to 12 students. Primarily for department majors or advance undergraduate training program candidates. Prerequisites: THETR 280, 281, and permission of instructor. Registration only through department roster in the main office of the Center for Theatre Arts. Not offered 1995-96. Next offered 1996-97. A. VanDyke. Development of speech and dialects in dramatic text.

THETR 285 Creativity and the Actor
Summer. 3 credits. Limited to 16 students. D. Feldshuh.

Using mime, physical and vocal exercises, karate, Gestalt therapy, theatre games, and Zen meditation, this course will attempt to make the student more aware of how he/she participates in and can influence the creative process of acting and to assist the student toward a greater capacity for stage presence. The course will deal with hindrances to the creative response (stage fright, self-consciousness, mannerisms, physical and vocal tension, emotional blocks), introduce the concepts of energy, stillness, and space, and explore the relationship between emotion, mind and body structure. It will attempt to give the individual tools with which the student may continue to expand his/her capacity for spontaneous, flexible, and believable acting.

THETR 287 Summer Acting Workshop
Summer. 3 credits. Limited to 16 students in a section. D. Feldshuh. An introduction to the processes of acting. Practice in training techniques, rehearsal procedures, and methodology.

THETR 288 Acting II
Fall. 3 credits. Prerequisite: THETR 281 and audition. Limited to 12 students. R. Wilson.

A continuation of Acting I. Special consideration will be given to a physical approach to characterization utilizing the plays of Chekhov and Ibsen.

THETR 289 Acting III: Advanced Scene Study
Spring. 3 credits. Prerequisite: THETR 280, 281, and audition. Limited to 10 students. K. Grant.

This course focuses on advanced problems in language and period style (movement, bow, curtsies, and period dances). Monologues and scenes will be drawn from these playwrights: Shakespeare and Moliere.

THETR 381 Musical Theatre
Spring. 3 credits. Prerequisites: THETR 281 and permission of instructor. Limited to 10 students. K. Grant. Preparation, performance and critique of scenes from the repertoire of post-1960 musical theatre pieces. The course will also explore basic musical theatre dance styles, e.g., tap and jazz.

THETR 382 Movement for the Actor
Fall. 3 credits. Prerequisites: THETR 281 and permission of instructor. Limited to 10 students. Not offered 1995-96. Next offered 1996-97. R. Wilson. Physical skills for the actor will be developed through work with LeCocq-based Neutral Mask technique, Commedia Dell'Arte Half-mask technique, and basic unarmed stage combat technique.

THETR 383 Modern Performance Problems
Fall. 4 credits. Prerequisites: THETR 240, 280, 281 and permission of instructor. Limited to 14 students. Not offered 1995-96. Next offered 1997-98. J. E. Gainor and R. Wilson. This class is a combination of play analysis and performance focused on the special problems of gender issues in modern dramatic material. Playwrights to be studied are Aeryl Churchill, Sam Shepard, and Marsha Norman. The class will not only deal with some of the plays by these authors, but also critical writing based on their work. Requirements will include the performance of monologues and scenes and the writing of three papers.

THETR 384 Advanced Playwriting
Fall or spring. 1-4 credits. Prerequisites: THETR 280, 281, 283 and permission of instructor. D. Feldshuh. A laboratory for the discussion of student plays. Following exercises in dramatic structure and technique, students will be expected to complete a one-act play.

THETR 385 Design
Fall. 4 credits. Limited to 12 students. Prerequisite: permission of instructor. R. Wilson. A laboratory for the discussion of student plays. Following exercises in dramatic structure and technique, students will be expected to complete a one-act play.

THETR 386 Fundamentals of Directing II
Spring. 4 credits. Enrollment strictly limited. Prerequisite: THETR 280 and 398, and permission of instructor. Recommended: THETR 250 and 281. D. Feldshuh. This course builds on the staging techniques learned in Fundamentals of Directing I. In this course each student will direct a series of projects and public presentations focusing on specific directorial challenges. The student will develop an increased ability to articulate and defend directorial choices and learn to work with actors on a diverse range of material. Directors will cast from a company of actors to be auditioned early in the semester. Each actor in the company will earn one or two credits as part of Theatre Arts 155.02.

THETR 387 Seminar in Directing
Fall or spring. 1-4 credits. Prerequisites: THETR 240, 250, 280, 398, 398, and permission of instructor. D. Feldshuh. This seminar will give the student the opportunity to direct a full evening of theatre. It may also involve an internship with a prominent director on campus and a final paper focusing on a specific aspect of directing.

THETR 388 Advanced Playwriting
Fall. 4 credits. Prerequisite: THETR 348 and permission of instructor. Not offered 1995-96. Next offered 1996-97. R. Wilson. A laboratory for the discussion of student plays. Following exercises in dramatic structure and technique, students will be expected to complete a one-act play.

THETR 389 Seminar in Playwriting
Fall. 1-4 credits. Prerequisite: THETR 348 and 349 and permission of instructor. R. Wilson.

THETR 497 Design, Technology, and Stage Management
Fall and spring. 3 credits. Not open to first term freshman. Limited to 12 students. Registration only through department roster in CTA 225. A minimum of one credit of Production Lab (THETR 151 or 251) is strongly recommended concurrently. K. Goetz, R. Archer, J. Johnson, C. Hatcher, and C. Orr Brookhouse. An introduction to design and technology in the theatre. Lectures, discussion, and project focused, practical exercises to teach the student fundamental staging techniques that bring a written text to theatrical life. A core objective of the course is to increase the student's awareness of why and how certain stage events communicate effectively to an audience. Each student will direct a number of exercises as well as a short scene.

THETR 498 Fundamentals of Directing II
Spring. 4 credits. Enrollment strictly limited. Prerequisite: THETR 280 and 398, and permission of instructor. Recommended: THETR 250 and 281. D. Feldshuh. This course builds on the staging techniques learned in Fundamentals of Directing I. In this course each student will direct a series of projects and public presentations focusing on specific directorial challenges. The student will develop an increased ability to articulate and defend directorial choices and learn to work with actors on a diverse range of material. Directors will cast from a company of actors to be auditioned early in the semester. Each actor in the company will earn one or two credits as part of Theatre Arts 155.02.

THETR 499 Seminar in Directing
Fall or spring. 1-4 credits. Prerequisites: THETR 240, 250, 280, 398, 398, and permission of instructor. D. Feldshuh. This seminar will give the student the opportunity to direct a full evening of theatre. It may also involve an internship with a prominent director on campus and a final paper focusing on a specific aspect of directing.

THETR 500 Modern Performance Problems
Fall. 4 credits. Prerequisites: THETR 240, 280, 281 and permission of instructor. Limited to 14 students. Not offered 1995-96. Next offered 1997-98. J. E. Gainor and R. Wilson. This class is a combination of play analysis and performance focused on the special problems of gender issues in modern dramatic material. Playwrights to be studied are Aeryl Churchill, Sam Shepard, and Marsha Norman. The class will not only deal with some of the plays by these authors, but also critical writing based on their work. Requirements will include the performance of monologues and scenes and the writing of three papers.

THETR 501 Directing
Fall or spring. 1-4 credits. Prerequisites: THETR 348 and permission of instructor. Not offered 1995-96. Next offered 1996-97. R. Wilson. A laboratory for the discussion of student plays. Following exercises in dramatic structure and technique, students will be expected to complete a one-act play.

THETR 502 Seminar in Directing
Fall. 1-4 credits. Prerequisite: THETR 348 and 349 and permission of instructor. R. Wilson.

THETR 503 Design
Fall and spring. 3 credits. Not open to first term freshman. Limited to 12 students. Registration only through department roster in CTA 225. A minimum of one credit of Production Lab (THETR 151 or 251) is strongly recommended concurrently. K. Goetz, R. Archer, J. Johnson, C. Hatcher, and C. Orr Brookhouse. An introduction to design and technology in the theatre. Lectures, discussion, and project
work introduce the principles of designing scenery, costumes, lighting and sound, and the technical process of realizing designs on stage. Students are required to purchase materials which the instructor will specify (approximate cost, $35).

THETR 343 Costume History: From Fig Leaf to Vanity
Fall. 3 credits. Limited to 20 students. C. Orr Brookhouse. Costume History will offer an overview of the history of clothing from the first signs of clothing to the present. It will investigate personal, social, religious, political, and regional reasons for why and how clothing evolved.

THETR 362 Lighting Design Studio I: Lighting in the Performing Arts
Fall and summer. 4 credits. Students are required to purchase lighting software and materials which the instructor will specify (approximate cost $175.00). Prerequisite: THETR 252 and 340 or permission of instructor. Limited to 6 students. E. Intemann. An exploration of the process of seeing, basic theories of color, and the psychological and physical characteristics of light. Through discussion, design projects based on current Cornwell productions, a series of projects in the lab, and an actual dance-lighting design as a final project, this course considers the role of light as a flexible, expressive art medium, its visual elements and dramatic impact, and the inherent nature of a successful approach to stage lighting.

THETR 364 Scenic Design Studio
Fall. 3 credits. Students are required to purchase materials which the instructor will specify (approximate cost: $50.00). Limited to 10 students. Prerequisite: THETR 250 and 340 or permission of instructor. K. Goetz. An exploration of the process of designing scenery for the live theatre. Emphasis on the analysis of the dramatic text, research, and the use of imagery to support dramatic intent of the playwright. Class projects will engage students in using a variety of mediums to explore how architecture, the arrangement of space, and elements of interior design are used in various class activities and projects are designed to encourage the development of student's innate expressive abilities. Experience in theatre production and graphic skills is helpful but not essential. May be repeated for credit.

THETR 366 Costume Design Studio
Spring. 3 credits. Students are required to purchase materials which the instructor will specify (approximate cost: $50.00). Prerequisite: Permission of instructor. Limited to 10 students. J. Johnson. Design of costumes for the theatre, concentrating on script and character analysis, period research, design elements, figure drawing and rendering skills, and understanding production style. May be repeated for credit.

THETR 368 Sound Design Studio
Spring. 4 credits. Limited enrollment to 6 students. Prerequisite: THETR 250 or 252 or permission of instructor. Students are required to purchase supplies (approximate cost $30.00). C. Hatcher. The use of sound as a medium for design for the theatre; research and creation of sound score, recording and engineering techniques, live effects and projects in live and studio sound production.

THETR 462 Lighting Design Studio II: Lighting in the Environment
Spring. 4 credits. Prerequisite: THETR 362 or permission of instructor. Limited to 5 students. E. Intemann. This course concentrates on the individual development of the lighting designer as a versatile artist. Discussion and guest artist lectures are combined with individual tutorial sessions and various environmental lighting design competition entries tailored to each student. This structure provides students with an opportunity to originate an independent contemporary style of lighting design.

Technology

THETR 252 Technical Production Studio I
Fall. 3 credits. Limited to 6 students. C. Hatcher. Stage Lighting and Sound Technology: The practical aspects of lighting and sound technology including equipment setup, engineering, electrical organization, recording techniques, and production paperwork will be explored through projects, lectures, and class discussions. In addition to twice-weekly class meetings the course requires a laboratory commitment of fifty hours for the semester.

THETR 254 Theatrical Make-up Studio
Fall. 3 credits. Students are required to purchase make-up kits which the instructor will provide (approximate cost $40.00). Prerequisite: permission of instructor. Limited to 12 students. Not offered 1995-96. Next offered 1996-97. J. Johnson. Basic techniques of make-up for the stage including corrective, old age, and fantasy; use of prosthetics, wigs, hair and hairpieces.

THETR 340 Theatrical Drafting and Technical Drawing Studio
Fall. 3 credits. Limited to 6 students. Prerequisite: THETR 250 or permission of instructor. S. Brookhouse. Implementation of the fundamentals of drafting and technical drawing. Introduction of the concept of an individual style in the approach to drafting. A series of projects to familiarize students with the convention and process of visualization and drafting.

THETR 352 Themed Entertainment: The Technical Perspective
Fall. 3 credits. Limited to 12 students. R. Archer. A broad-based inquiry into the integration of art and science in today's theme parks and interactive entertainment attractions. Papers, projects, and discussions will deal with planning and development aspects of large-scale entertainment projects including architecture, engineering, construction, and attraction installation. Focus will be on the specialized entertainment technologies that make these attractions work: audio and lighting design, ride and show control systems, and special effects.

THETR 354 Stagecraft Studio
Fall. 3 credits. A minimum of one credit of production laboratory (THETR 151 or 251) is strongly recommended concurrently. Prerequisite: THETR 250 or permission of instructor. R. Archer. An exploration of the techniques and practice of theatre operation, scenic construction, stage mechanics, rigging, painting, and model building.

THETR 356 Costume Construction Studio
Spring. 4 credits. A minimum of one credit of production laboratory (THETR 151 or 251) is strongly recommended concurrently. Prerequisite: THETR 250 or permission of instructor. Lab fee of $25 to be paid in class. C. Orr Brookhouse. A project lecture/discussion class in costume research, patterning, cutting, construction, and fitting.

Stage Management

THETR 153 Stage Management Production Laboratory I
Fall and spring. 1-2 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium theatre at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: permission of instructor. P. Lillard. Practical experience in theatrical production as Assistant Stage Manager for a Dance Theatre Concert or as a Stage Manager for readings or S.L.T.C. under the supervision of the faculty Production Manager. THETR 370 complements this course.

THETR 253 Stage Management Laboratory II
Fall and spring. 1-4 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium theatre at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: permission of instructor. P. Lillard. Practical experience in theatrical production as Assistant Stage Manager for a season production under the supervision of the faculty Production Manager. THETR 370 complements this course.

THETR 353 Stage Management Laboratory III
Fall and spring. 1-4 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium theatre at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: permission of the instructor. P. Lillard. Practical experience in theatrical production as Stage Manager for a Dance Theatre Concert, for an AUTP production or as Production Stage Manager for the Black Box lab season under the supervision of the faculty Production Manager. THETR 370 complements this course.

THETR 370 Stage Management Studio
Fall. 2 credits. Prerequisite: THETR 250 or 280. Not offered 1995-96. Next offered 1996-97. P. Lillard. Introduction to the concepts and techniques of stage management as they relate to specific areas of production. Development of relevant communication skills and an understanding of the production process as experienced by a working stage manager or assistant stage manager. THETR 153, 253, and 355 complement this course.
**THETR 453 Stage Management Laboratory IV**
Fall and spring. 1-5 credits. May be repeated for credit. Before registering, students must attend orientation meeting in the Proscenium at the Center for Theatre Arts at 7:30 p.m. on the first Tuesday of classes. Prerequisite: admission to Advanced Undergraduate Theatre Program. P. Lillard.

Practical experience in theatrical production as Stage Manager for a season production under the supervision of the faculty Production Manager.

**Production Laboratories**

**THETR 151 Production Laboratory I**
Fall and spring. 1-3 credits. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the Proscenium Theatre. P. Lillard, S. Brookhouse, N. Cross, C. Hatcher, C. Orr Brookhouse. Students register for sections by areas of interest. 01 Scenery, 02 Costumes, 03 Properties, 04 Lighting, 05 Sound, 06 Stage crew. No prerequisites or experience required. This course provides practical experience in theatrical production, as a member of the production crew.

**THETR 251 Production Laboratory II**
Fall and spring. 1-3 credits. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the CTA Proscenium theatre. P. Lillard, S. Brookhouse, N. Cross, C. Hatcher, C. Orr Brookhouse. Practical experience in theatrical production, in a position of major responsibility on the production staff. Students register for sections by areas of interest. 01 Scenery, 02 Costumes, 03 Properties, 04 Lighting, 05 Sound.

**THETR 351 Production Laboratory III**
Fall and spring. 1-3 credits. May be repeated for credit. Orientation meeting on the first Tuesday of classes each semester at 7:30 p.m. in the CTA Proscenium Theatre. Prerequisite: THETR 251 or permission of instructor. P. Lillard, C. Hatcher, J. Johnson, C. Orr Brookhouse. This course provides practical experience in theatrical production, in a position of major responsibility on the production staff or as assistant to a faculty or guest designer.

**THETR 451 Production Laboratory IV**
Fall and spring. 1-4 credits. May be repeated for credit. Prerequisite: admission to Advanced Undergraduate Theatre Program. P. Lillard, K. Goetz, C. Hatcher, J. Johnson, C. Orr Brookhouse. Practical experience in theatrical production, in the position of designer or in another position of major responsibility on the production staff.

**INDEPENDENT STUDY, INTERNSHIPS AND HONORS**

**THETR 300 Independent Study**
Summer, fall, or spring. 1-4 credits. Independent Study in the Theatre allows students the opportunity to pursue special interests not treated in regularly scheduled courses. A faculty member, who becomes the student’s instructor for the course, must approve the student’s program of study and agree to provide continuing supervision of the work. Students must prepare a proposal for independent study.

**THETR 485 Undergraduate Internship**
Fall, spring, or summer. 1-6 credits. To be eligible to enroll and receive credit for an internship, Theatre Arts students must either be majors or be admitted to the Advanced Undergraduate Theatre Program (AUTP). Students are responsible for arranging their own internships in consultation with the AUTP faculty in their area of choice prior to the beginning of the semester in which the internship is planned to take place. To receive credit for this course, it must be an unpaid internship; if it is paid, paid, it is possible to receive independent study (see TA 300) credit for it.

**THETR 495 Honors Research Tutorial**
Fall or spring. 2-6 credits. Limited to Theatre Arts seniors only.

This course is the first of a two-semester sequence (the second is THETR 496). Up to eight credit hours and one grade will be given upon completion of second semester. The Theatre Arts honors program is for majors who have demonstrated exceptional ability in the major and who seek an opportunity to explore branches of their subject not represented in the regular curriculum or to gain experience in original research. To be a part of the honors program the student must maintain an average of 3.5 in departmental courses and an average of 3.0 in all courses. Students should consult with their advisers in their junior year if deciding to do honors. Admissions to honors is at the discretion of the departmental committee.

**THETR 496 Honors Thesis Project**
Fall or spring. 2-8 credits. Limited to Theatre seniors only.

This course is the second of a two-semester sequence (the first is THETR 495). Up to eight credit hours and one grade will be given upon completion of second semester. See THETR 495 for further information.

**FILM**

**THETR 274 Introduction to Film Analysis: Meaning and Value**
Fall. 4 credits. Limited to thirty-five students. D. Fredericksen.

An intensive consideration of the ways films generate meaning and of the ways we attribute meaning and value to films. Discussion ranges over commercial narrative, documentary, and personal film modes. Prospective film majors should enroll in their sophomore year.

**THETR 277 Video Production I**

A hands-on video production course using Super-VHS cameras and editing equipment. Students will learn camera, lighting, sound recording, and editing techniques through a series of exercises. Directing for both single-camera and multiple-camera shoots will be practiced. Strategies for documentary, dramatic and experimental work, music videos, etc., will be discussed before students plan, write, shoot, and edit one short, individual project and one project of their choice. A $100 equipment maintenance fee per student will be collected in class. Students will spend approximately $50-100 for S-VHS and regular VHS videotapes, which they will own.

**THETR 290 Filming Other Cultures (also Anthropology 102)**
Spring. 3 credits. Limited to 20 students, with preference given to those who have taken either Anthropology 102 or Theatre Arts 274. R. Archer.

For description, see Anthropology 290.

**THETR 313 Japanese and Asian Film (also Comparative Literature 313)**

For description, see ASIAN 313.

**THETR 375 History and Theory of the Commercial Narrative Film**
Fall. 4 credits. Fee for screening expenses, $10 (paid in class). Offered alternate years. Not offered 1995-96. Next offered fall 1996. D. Fredericksen. Consideration of the broad patterns of narration in the history of the commercial narrative film, viewed as an artistic medium and as a system requiring the massive consumption of artifacts. Emphasizes placed upon the early articulation of a cinematic means of narration, realism as an artistic style, the nature and functions of popular film, and the modes of modernist and post-modernist "art cinema" narration. Major figures discussed include Griffith, Eisenstein, Murnau, Von Stroheim, Dreyer, Chaplin, Renoir, Ford, Hitchcock, Welles, Antonioni, Fellini, Bergman, Bunuel, Resnais, Godard, Janaco and Herzog. Students should have previously taken Theatre Arts 274.

**THETR 376 History and Theory of Documentary and Experimental Film**
Fall. 4 credits. Fee for screening expenses, $10 (paid in class). Prerequisite: THETR 274 is strongly recommended, but not required. D. Fredericksen.

First, the history and theory of documentary film up to the end of World War II. Major figures covered include Vertov, Flaherty, Ivens, Grierson, Lorentz, Riefenstahl, Capra, Hurwitz, and Jennings. Second, within the history and theory of the experimental and personal film forms, emphases are: the avant-garde film of the twenties in Germany, France, U.S.S.R., and the U.S., the movement toward documentary practice in the thirties, and American experimental and personal film from the forties to the present. Major figures covered in this latter period include Deren, Brajkovich, Baille, Belsen, the Whitney's Hill, Snow, Piti, L. Jordan, H. Smith, G. Nelson and Mekas.

**THETR 377 Fundamentals of 16mm Filmmaking**
Fall and spring. 4 credits. Limited to 12 students. Intended for juniors and seniors (who may need to sign up a year or more in advance). Prerequisite: THETR 274 or higher-level film studies course and permission of instructor. Fee for maintenance costs, $100 (paid in class). The average cost to each student for materials and processing is $400. M. Rivchin.

A hands-on course in the basics of 16mm filmmaking techniques, requiring no prior production experience, emphasizing the creative development of filmic ideas through personal film making. Each student will complete a number of short film projects to explore...
narrative, experimental, documentary, animation, and abstract genres. A final sound film project (8-12 minutes) will be screened publicly.

[THETR 378 Soviet Film of the 1920s and French Film of the 1960s]
Spring. 4 credits. Fee for screening expenses, $10 (paid in class). Prerequisite: THETR 375 is strongly recommended, but not required. Offered alternate years. Not offered 1995-96. Next offered spring 1997.
D. Fredericksen.

An intensive treatment of two distinct periods of innovation in film theory and history. Emphasis on the vital relationship between theory and practice in these two periods. Major figures include Eisenstein, Pudovkin, Vertov, Dovzhenko, Room, Godard, Truffaut, Resnais, Rohmer, Tati, Rouch and Bresson.

[THETR 379 Documentary Film from 1945 to present]
Spring. 4 credits. Prerequisite: THETR 376 or permission of the instructor. Fee for screening expenses, $10 (this fee is paid in class). D. Fredericksen.

Emphasizes on the contemporary documentary film as a sociopolitical force, as an ethnographic tool within and without a filmmaker's own culture, and as an artistic form with a distinct history and set of theoretical questions. Major figures, structures, and movements covered include Jennings, Rouquier, Leacock, Malle, Rouch, Solanas, national film boards, Challenge for Change, direct cinema, cinema verite, revolutionary documentary of the Third World and feminist documentary. The scope is international.

[THETR 383 Screenwriting]
Spring. 3 credits. Prerequisites: THETR 274 and 377, and permission of instructor. Limited to 12 students. R. Wilson.

Exercises in various genres of screenwriting will be explored: the commercial narrative, documentary, experimental, and abstract. This class will culminate in the writing of a finished script for a ten to fifteen-minute film. Note: This class is an intensive writing experience that will demand a great deal of outside work.

[THETR 395 Video: Art, Theory, Politics (also English 395)]
Fall. 4 credits. T. Murray.
For description, see English 395.

[THETR 396 German Film (also Comparative Literature 396 and German Studies 396)]
Spring. 4 credits. Requirements: participation in class discussion, one paper, midterm, and final. D. Barthrick.
The goal of the course is to explore the form and context of German film in relation to the cultural and sociopolitical context of which it is a part. Accordingly, the material discussed will be divided into three major periods: Weimar film, 1918-1933; Nazi film, 1933-45; postwar film, 1945-present. Readings and lectures will be devoted to formal and cultural developments in the history of German film as well as interpretive analysis of selected individual films. In both lectures and discussions, particular emphasis will be placed on helping students develop an appropriate method of viewing and analyzing films.

[THETR 413 Film and Performance]
Spring. 4 credits. Prerequisite: At least one production course in 16mm film or video, and/or at least one 300-level course in acting or directing. Permission of the instructor. Limited to 12 students. $50 maintenance fee to be collected in class.
M. Rivchin and R. Wilson.

Special Topic for 1996: Acting and Directing for the Camera. This course is a collaborative production workshop designed to bring acting, directing, and filmmaking students together to work on several short projects. Students will work first on script/scene analysis and questions of staging actors and blocking for the camera. Using primarily video cameras and video editing, they will practice alternative strategies for directing and examine the particular techniques of acting for the camera. Final group projects will be original scripts produced in video and presented in a public screening at the end of the semester.

[THETR 422 Crimes of the Nation and Cinematic Memories (also Society for the Humanities 422)]
Spring. 3 credits. Limited to 17 students. N. Wood.
For description, see Society for the Humanities 422.

[THETR 475 Seminar in the Cinema I (also College Scholar Seminar)]
Spring. 4 credits. Limited to 20 students. D. Fredericksen.
Topic for 1996: Jung, film, and the process of self-knowledge. "Know thyself": this has been called our culture's most enduring psychological need, and it has been frequently offered as the raison d'être for liberal studies. C. G. Jung's answer to how one might "know oneself" is based on his claim that "image is psyche"; his informing metaphor is depth. The seminar will trace the elaborations of this position in Jung, James Hillman, Russell Lockhart, Murray Stein, and Sylvia Perera. It will also test the critical capacities of this position with respect to film images given us by Bergman, Fellini, Stan Brakhage, Gunvor Nelson, Suzann Pitt, Larry Jordan, Bruce Baillie, and others. Those wined and dined in which Jung's claim might provide an archetypal and imaginal alternative to current approaches to liberal studies will be asked throughout the seminar: the nature of education will thereby become a central theme of the semester's work.

[THETR 476 Seminar in the Cinema II]
Fall. 4 credits. Prerequisite: THETR 274 or 375 or comparable experience in dramatic writing, or for video editing and mixing. A final sound film proposal must be kept to a minimum of ten minutes. The class will form two production crews, rotating as directors, cinematographers, and sound recordists for each other's projects. Students may also opt for shooting in film, transferring to and editing on videotape, or working entirely on videotape. Students will edit the films they write and direct, and the camera and sound will be individually responsible for all film flatbed editing, sound track mixing, A&B rolling options, and lab work; or for video editing and mixing. A public screening for finished projects will be held at the end of the semester.

[THETR 489 Advanced Film and Video Projects]
Spring. 4 credits. Limited to 6 students. Prerequisite: THETR 377, 383, and 477; recommended 398 (Directing I). M. Rivchin.

This is a third-level film production course for those students who have already written and proposed a scripted dramatic narrative, a documentary treatment, or a storyboarded experimental or animated film project. (Sync-sound film proposals must be kept to a minimum of ten minutes.) The class will form two production crews, rotating as directors, cinematographers, and sound recordists for each other's projects. Students may also opt for shooting in film, transferring to and editing on videotape, or working entirely on videotape. Students will edit the films they write and direct, and the camera and sound will be individually responsible for all film flatbed editing, sound track mixing, A&B rolling options, and lab work; or for video editing and mixing. A public screening for finished projects will be held at the end of the semester.

[THETR 653 Myth onto Film]
Fall. 4 credits. R. Ascher.
For description, see ANTHR 653.

[THETR 699 German Film Theory (also German Studies 690 and Comparative Literature 699)]

This course will examine critically the writings of major German film theories from the Weimar period to the present. Works by Bela Balazs, Rudolf Arnheim, Siegfried Kracauer, Walter Benjamin, Theodor Adorno, Max Horkheimer, Alois Riegl, and H. J. Syberberg, Gertrud Koch, Thomas Elsaesser, and others will be read and discussed in light of the following considerations: What are the cultural and political contexts out of which these ideas emerge and how are these theories addressing these contexts? How do these theories relate to the work coming out of other national traditions at the same time or to current debates in feminist, formalist, postmodern, or poststructuralist film theory. There will be film showings.

DANCE

[THETR 123 Ballet I (also Physical Education 423)]
Fall and spring. 1 credit. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Theatre Arts and Physical Education registration at Teagle Hall only. B. Suber.
The fundamentals of classical ballet technique. Material covered includes all of the exercises at the barre, and elementary work in the areas of port de bras, adage and petite and grande allegro. The acceleration of the class is determined by the ability of the majority of the class.
THETR 124 Modern Dance I (also Physical Education 424)  
Fall and spring. 0 or 1 credit. Theatre Arts and Physical Education registration at Teagle Hall only. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall. Sec 01: J. Self; Sec 02: J. Chu; spring. Sec 01: J. Self; Sec 02: J. Kovar.  
The fundamentals of modern dance technique.  
Elementary dance movement phrases, with attention to rhythm, placement, and vitality of performance.

THETR 125 Tap Dance I (also Physical Education 425)  
Fall. 0 credit. Theatre Arts and Physical Education registration at Teagle Hall only. Satisfies the PE requirement if taken as PE. Staff.  
Understanding of rhythm, coordination, sound emphasis, through basic tap steps.

THETR 155 Rehearsal and Performance  
Fall and/or spring. 1–2 credits. 1 credit per production experience per term up to 2 credits per term. Students must register for the course in the term in which credit is earned; requests for retroactive credit will not be honored. Limited to students who are assigned roles after tryouts at the dance program’s auditions. Students should add this course only after they have been assigned roles. S-U grades only.  
The study, development, and performance of roles in departmental theatre or dance productions or the study and practice of directing as experienced in assisting faculty and guest directors.

[THETR 200 Introduction to Dance  
Fall. 3 credits. Attendance at dance concerts is required. Not offered 1995–96. Next offered 1997–98.]

THETR 201 Dance Improvisation  
Fall. 3 credits. Limited to 12 students. Concurrent enrollment in a dance technique class at the appropriate level is required. Registration only through department roster in the main office of the Center for Theatre Arts. Attendance at dance concerts is required. J. Self.  
When the body knows when, where, and how to move without preconceived direction, we call that improvisation. This course offers the possibility of “training” one’s movement instincts to respond with lightness, humor, grace, and spontaneity. Solo and group forms are covered. Includes some dance history.

[THETR 209 Introduction to African Dance (also AS&RC 209)  
An introduction to ancient African dance forms, origins, socio-economic and political significance; the state of the dances, changes and continuing relevance in contemporary times. This course will look at the evolution and significance of contemporary dance forms.]

THETR 210 Beginning Dance Composition and Music Resources  
Spring. Concurrent enrollment in a dance technique class at the appropriate level is required. Registration only through the department roster in the main office of the Center for Theatre Arts. Attendance at dance concerts is required. B. Suber.  
Weekly assignments are designed to introduce students to basic elements of dance traditionally and currently used in the choreographic process. Problems are defined and explored through class improvisation as a way to encourage freshness, dynamic solutions. Students compose and present a series of short studies that are discussed and reworked before being performed at informal studio showings. The music resource faculty will introduce the class to contemporary music for modern dance and orient the class regarding problems and possibilities with sound collaborations. Students are required to attend campus dance activities for class discussion.

THETR 211 Dance Movement Workshop  
Summer. 3 credits. Limited to 15 students. For students with varied levels of training, including those with no experience. J. Kovar.  
Students explore new ways of moving and creating dances and prepare short studies each week based on material covered in class. Modern dance technique, improvisation, and composition are covered. Students observe and discuss the main concerns of contemporary performance from the artist’s/performer’s perspective. Viewings of films, videotapes, and live performances.

[THETR 225 Tap Dance II (also Physical Education 431)  
Fall. 0 credit. Theatre Arts and Physical Education registration at Teagle Hall. Satisfies PE requirement if taken as PE. Prerequisite: permission of instructor. Attendance at dance concerts required. Not offered 1995–96. Next offered 1996–97. Staff.  
Applying tap steps to a more intricate expression of technique, while developing musicality and improvisational skills.]

THETR 231 Ballet II (also Physical Education 431)  
Fall and spring. 0 or 1 credit. Theatre Arts and Physical Education registration at Teagle Hall only. Prerequisite: permission of instructor. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. B. Suber.  
An intermediate ballet class that is a continuation of Ballet I with intermediate work in the areas of port de bras, adage and petite grande allegro. There is an emphasis on placement through muscular harmony.

THETR 232 Modern Dance II (also Physical Education 432)  
Fall and spring. 0 or 1 credit. Theatre Arts and Physical Education registration at Teagle Hall only. Prerequisite: Modern Dance I or permission of instructor. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Fall: J. Kovar, Spring: J. Chu.  
A continuation of Modern Dance I, for students with at least a year of dance training. Practice of longer dance phrases, with attention to clarity of design, rhythm, and expression.

THETR 233 Explorations in Movement and Performance A (also Physical Education 440)  
Fall. 0 or 1 credit. Limited to 16 students. Theatre Arts and physical education registration at Teagle Hall only. Satisfies PE requirement if taken as PE. Attendance at dance concerts is required. J. Self.  
This course is a physically demanding exploration into a wide range of movement realms. Specific subjects covered are genderized movement, erotic power, spiritual power, music and movement, and ritual and performance. Techniques include extensive use of breath, animal movement, improvisation, and group games. This course requires an eagerness to investigate the nature of performance and explore unfamiliar territory in movement.

[THETR 304 Ballet III (also Physical Education 434)  
Fall and spring. 0 or 1 credit. May be repeated for credit. Prerequisite: permission of instructor. Theatre Arts and physical education registration at Teagle Hall only. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. Not offered 1995–96. Next offered 1996–97. B. Suber.  
Study and practice of classical ballet at an advanced level. Work is done on strengthening the body through harmonic muscular control combining Russian, Danish and American techniques.]

THETR 305 Explorations in Movement and Performance B (also Physical Education 440)  
Spring. 0 or 1 credit. Explorations A, dance improvisation or permission. May be repeated for credit. Limited to 16 students. Theatre Arts and physical education registration at Teagle Hall only. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. J. Self.  
This course continues the investigations of Explorations A with special emphasis on performance and ritual. The class will create performance opportunities throughout the semester.

THETR 306 Modern Dance III (also Physical Education 436)  
Fall and spring. 0 or 1 credit. May be repeated for credit. Prerequisite: Modern Dance II or permission of instructor. Theatre Arts and physical education registration at Teagle Hall only. Satisfies PE requirement if taken as PE. Attendance at dance concerts is required. Fall: J. Morgenroth; Spring: Sec. 01, J. Self; Sec. 02: J. Morgenroth.  
Advanced work with rhythm, placement, and phrasing for students who are prepared to refine technical skills of dancing. Students will be physically and mentally challenged by lengthy, complex phrases and will be expected to bring the instructor’s material to life.

THETR 307 Asian Dance and Dance Drama (also Asian Studies 307)  
Fall and spring. 0, 1 or 3 credits. May be repeated for credit. Theatre Arts and physical education registration at Teagle Hall only. Satisfies the PE requirement if taken as PE. Attendance to dance concerts is required. D. Bor.  
This course is designed to give the student a practical working knowledge of Indian classical dance, specifically the indigenous style of Orissa known as Odissi, the fundamentals of which can be applied to other forms of Indian or Eastern dance. The high systematized technique is used to open and strengthen the body through specific exercises and movements and to develop grace and dexterity that can benefit all forms of dance. Emphasis will also be placed on rhythmic expression.
A continuation of THETR 310.

The origins of classical ballet will be explored. This survey will examine the development of ballet from its roots in the courts of Europe to its form as the dance of the 19th and 20th centuries. The emphasis will be on the Western classical tradition, but we will also consider other influences. The Monday and Wednesday classes will consist of learning basic movement vocabulary and dances. No previous experience in dance is necessary.

THETR 308 Modern Dance IV (also Physical Education 438)
Fall and spring. 0 or 1 credit. Pre-requisite: Modern Dance III or permission of instructor. This course will be devoted to expanding the music vocabulary and skills of students through a survey of contemporary music for modern dance. The course is open to students with a background in ballet or other dance forms. The course will be taught on a regular basis.

THETR 310 Intermediate Dance
Fall and spring. 3-4 credits. Prerequisite: THETR 210. Attendance at dance concerts is required. This course is designed for students who have completed the basic level of dance and wish to continue their study in the intermediate level. The course will be taught on a regular basis.

THETR 312 Physical Analysis of Movement
Fall. 3 credits. J. Morgenroth. This course is designed for students who are interested in the physical analysis of movement. The course will be taught on a regular basis.

THETR 314 Western Dance History I: Classical Ballet History as a Reflection of Western Ideology
Fall. 4 credits. Attendance at dance concerts is required. B. Suber. A critical survey of the history of classical ballet. The course will be taught on a regular basis.

THETR 315 Western Dance History II: History of Modern Dance
Spring. 4 credits. Attendance at dance concerts is required. J. Morgenroth. A continuation of THETR 314. This course will be taught on a regular basis.

THETR 317 Asian Dance II
Spring. 0 or 1 credit. Prerequisite: THETR 307 or previous training in Odissi Classical Dance. Dance History and Physical Education Registration at Teagle Hall only. Satisfies the PE requirement if taken as PE. Attendance at dance concerts is required. D. Bo. A continuation of THETR 307. This course is designed for students who have completed the basic level of dance and wish to continue their study in Asian dance forms. The course will be taught on a regular basis.

THETR 410 Advanced Dance Composition I
Fall and spring. 3-4 credits. Prerequisite: THETR 310 and 511. Attendance at dance concerts is required. J. Chu and A. Fogelsanger. A continuation of THETR 410. This course is designed for students who have completed the basic level of dance and wish to continue their study in advanced dance composition. The course will be taught on a regular basis.

THETR 411 Advanced Dance Composition II
Fall and spring. 3-4 credits. Attendance at dance concerts is required. J. Chu and A. Fogelsanger. A continuation of THETR 410. This course is designed for students who have completed the basic level of dance and wish to continue their study in advanced dance composition. The course will be taught on a regular basis.

THETR 418 Seminar in History of Dance
Fall. 4 credits. Prerequisite: General knowledge of dance history recommended. A continuation of THETR 410. This course is designed for students who have completed the basic level of dance and wish to continue their study in the history of dance. The course will be taught on a regular basis.

THETR 490 Senior Paper in Dance
Spring. 4 credits. Prerequisite: THETR 410 or permission. Attendance at dance concerts is required. A continuation of THETR 410. This course is designed for students who have completed the basic level of dance and wish to continue their study in advanced dance composition. The course will be taught on a regular basis.

THETR 491 Senior Project in Dance
Fall or spring. 4 credits. Prerequisite: THETR 410 or permission. This course is designed for students who have completed the basic level of dance and wish to continue their study in advanced dance composition. The course will be taught on a regular basis.

Tracks toward admission into the advanced undergraduate theatre program

Design, Technology, and Stage Management
Required for individuals interested in a Design, Technology, or Stage Management track:

THETR 250 Fundamentals of Theatre Design and Technology
THETR 151 and 251 Production Lab I and II (at least one credit of each)

Required for Scenic Design emphasis:

THETR 340 Theatrical Drafting and Technical Drawing Studio
THETR 351 Production Lab III (as Design Assistant)
THETR 354 Stagecraft Studio
THETR 364 Scene Design Studio

Upon admission to the program: THETR 451 Production Lab IV (at least 1 credit)

Required for Costume Design emphasis:

THETR 254 Theatrical Make-up Studio
THETR 351 Production Lab III (as Design Assistant)
THETR 356 Costume Construction Studio
THETR 360 Costume Design Studio

Upon admission to the program: THETR 451 Production Lab IV (at least 1 credit)

Required for Lighting Design emphasis:

THETR 252 Technical Production Studio I
THETR 263 Computer-Aided Design for the Theatre
THETR 351 Production Lab III (as Student Electrician)
THETR 351 Production Lab III (as Design Assistant)
THETR 356 Lighting Design Studio I

Upon admission to the program: THETR 451 Production Lab IV (at least 1 credit)

Required for Sound Design emphasis:

THETR 252 Technical Production Studio I
THETR 351 Production Lab III (as Student Sound Technician)

THETR 351 Production Lab III (as Design Assistant)

THETR 368 Sound Design Studio

Upon admission to the program: THETR 451 Production Lab IV (at least 1 credit)

Required for Technical Direction emphasis:

THETR 252 Technical Production Studio I
THETR 256 Technical Production Studio II

THETR 354 Theatrical Drafting and Technical Drawing Studio

THETR 351 Production Lab III (as Assistant Technical Director)

THETR 354 Stagecraft Studio

Upon admission to the program: THETR 451 Production Lab IV (at least 1 credit)

Required for Stage Management emphasis:

THETR 253 or THETR 353 Stage Management Lab II or III

THETR 280 Introduction to Acting

THETR 370 Stage Management Studio

THETR 508 Fundamentals of Directing I

Upon admission to the program: THETR 453 Stage Management Lab IV (at least 1 credit)

Acting

Required for ALL individuals interested in an acting track:

THETR 151 and THETR 251 Production Lab I and II (at least 2 combined credits)

THETR 240/241 Introduction to Western Theatre (1 Semester ONLY)
THETR 250 Fundamentals of Design and Technology
THETR 280 Introduction to Acting
Required for Acting emphasis:
THETR 281 Acting I
THETR 282 Introduction to Voice and Speech for Performance or
THETR 284 Speech and Dialects for Performance
THETR 380 Acting II
Be accepted into THETR 381 Acting III

Directing
Required for ALL individuals interested in a directing track:
THETR 151 and THETR 251 Production Lab I and II (at least 2 combined credits)
THETR 240/THETR 241 Introduction to Western Theatre (1 Semester ONLY)
THETR 250 Fundamentals of Design and Technology
THETR 280 Introduction to Acting
THETR 398 Directing I
THETR 498 Directing II

Playwriting
Required for ALL individuals interested in a playwriting track:
THETR 240/THETR 241 Introduction to Western Theatre (1 Semester ONLY)
THETR 250 Fundamentals of Design and Technology
THETR 280 Introduction to Acting
Required for Playwriting emphasis:
THETR 348 Playwriting
THETR 349 Advanced Playwriting
Students in the advanced undergraduate theatre program may also elect to take THETR 485 (Undergraduate Internship) in addition to or in place of one production assignment.

WRITING PROGRAM
See John S. Knight Writing Program in the section, "Special Programs and Interdisciplinary Studies."

YIDDISH
See Department of Near Eastern Studies.

YORUBA
See Department of Modern Languages and Linguistics.

SPECIAL PROGRAMS AND INTERDISCIPLINARY STUDIES

Africana Studies and Research Center

The Africana Studies and Research Center is concerned with the examination of the history, culture, intellectual development, and social organization of Black people and cultures in the Americas, Africa, and the Caribbean. Its program is structured from an interdisciplinary and comparative perspective and presents a variety of subjects in focal areas of history, literature, social sciences, and African languages including Mandinka, Swahili, and Yoruba.

The center offers a unique and specialized program of study that leads to an undergraduate degree through the College of Arts and Sciences and a graduate degree, the Master of Professional Studies (African and African-American), through the university's Graduate School.

A student may major in Africana studies; however, another attractive alternative is the center's joint major program. This program enables the student to complete a major in any of the other disciplines represented in the college while at the same time fulfilling requirements for a major in Africana Studies. This requires only a few more credits than is usually the case when one completes a single major course of study. Courses offered by the center are open to both majors and nonmajors and may be used to meet a number of college distribution requirements, including historical/temporal breadth (#) and geographical breadth (@) requirements, such as freshman writing seminars, language (Mandinka, Swahili, Yoruba), expressive arts, humanities, social sciences, and history.

The center also brings distinguished visitors to the campus, sponsors a colloquium series, and houses its own library.

The Africana Major
The undergraduate major offers interdisciplinary study of the fundamental dimensions of the African-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 African-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 205, 231, 290, and 422. Beyond the core courses, the student must take 8 credits of center courses numbered 200 or above and 15 credits numbered 300 or above. The program of an undergraduate major may have a specifically Afro-American focus or a specifically African focus.

Joint Majors
The center encourages joint majors in the College of Arts and Sciences and in other colleges. Joint majors are individualized programs that must be worked out between the departments concerned. The center's undergraduate faculty representative, Professor Adams, will assist students in the design and coordination of joint major programs. However, in any joint major program, the center will require at least 16 credits be taken in Africana studies courses, including AS&RC 290.

Double Majors
In the case of double majors (as distinct from joint majors) students undertake to carry the full load of stipulated requirements for a major in each of the two departments they have selected.

Certificate in African Studies
In conjunction with the Institute for African Development, the Africana Studies and Research Center administers an undergraduate Certificate in African Studies program. The certificate is offered as a minor concentration available to students in all of the undergraduate colleges at Cornell. Many of the courses in the program might be used to fulfill other course distribution requirements. By pursuing this certificate, students acquire an interdisciplinary understanding of Africa. After developing a foundation of knowledge on the culture, society, and development of Africa in the core course "Africa: The Continent and Its People," students pursue 15 credit hours in a humanities or development studies track or a combination of the two, including an additional core course, either "African Civilizations and Cultures" or "Contemporary African Development Issues." The requirements for the certificate are a minimum of 18 credit hours, including the core courses.

Students interested in the certificate program
must contact Professor Adams (the center's undergraduate faculty representative) who will register them in the program and assign them a faculty adviser from their own college. The faculty adviser will be responsible for determining completion of the certificate requirements.

Honors. The honors program offers students the opportunity to complete a library research thesis, a field project in conjunction with a report on the field experience, or a project or experiment designed by the student. The requirements for admission to the honors program for all students—regular majors, joint majors, and double majors—are a B- cumulative average in all courses and a B+ cumulative average in the center's courses. Each student accepted into the honors program will have an honors faculty committee consisting of the student's adviser and one additional faculty member, which is responsible for final evaluation of the student's work. The honors committee must approve the thesis or project before May 1 of the student's junior year. The completed thesis or project should be filed with the student's faculty committee by May 10 of the senior year.

Distribution Requirement
Two Africana Studies and Research Center courses from the appropriate group may be used in fulfillment of the following distribution requirements:

Social sciences: AS&RC 171, 172, 190, 191, 204, 210, 211, 280, 290, 301, 302, 344, 345, 346, 351, 552, 400, 410, 420, 451, 460, 481, 484, 485, 495, 550, 551, 571.


Freshman writing seminars: AS&RC 100.

Language Requirement
Courses in Mandinka, Swahili, and Yoruba may be used to satisfy the College of Arts and Sciences language requirement. Successful completion of the Mandinka or Yoruba series AS&RC/DMLI 121, 122, 123 provides qualification, and study through 203 in either language provides proficiency. In Swahili, successful completion of AS&RC 131, 132, 133, and 134 provides qualification, and the addition of 204 provides proficiency. AS&RC majors are not required to take an African language, but the center recommends the study of one to complete the language requirement.

Courses
AS&RC 122 Sec 01 Elementary Yoruba (also YORUB 122)
Spring. 4 credits. Prerequisite: AS&RC 121, Sec. 01. V. Carstens and staff. Foundation provided in all basic language skills, with an emphasis on speech and aural comprehension. Classes provide speaking and listening practice.

AS&RC 122 Sec 02 Elementary Mandinka
For description, see MANDI 122.

AS&RC 123 Sec 01 Continuing Yoruba
Fall. V. Carstens and staff.
For description, see YORUB 123.

AS&RC 123 Sec 02 Continuing Mandinka
Not offered 1995–96; next offered fall 1996.
For description, see MANDI 123.

AS&RC 131 Swahili
Fall. 4 credits. A. Nanji.
Beginner's Swahili I—Grammar. Requires no knowledge of language.

AS&RC 132 Swahili
Spring. 4 credits. Prerequisite: Swahili 131.
A. Nanji.
Continued study of the basic grammatical formation of the language and the introduction of reading material ranging from songs to short stories. A great many drills help develop the student's comprehension. Swahili tapes are highly used.

AS&RC 133 Swahili
Fall. 4 credits. Prerequisites: Swahili 131 and 132. A. Nanji.
Advanced study in reading and composition.

AS&RC 134 Swahili
Spring. 4 credits. Prerequisite: Swahili 133.
A. Nanji.
In this course of the sequence more emphasis is placed on the development of reading ability and the acquisition of writing skills. Students are expected to read and comprehend selected Swahili stories and write compositions on chosen topics. Ample consideration is given to oral practice in the classroom.

AS&RC 171 Black Families and the Socialization of Black Children
Fall. 3 credits. P. Kaurouma.
Survey of key psychological dimensions of the Black experience, covering such issues as (1) Myths and Realities of Black family and culture; (2) Socialization of Black children; (3) Impact of class and gender; (4) Racism and the Black family.

AS&RC 172 The Education of Black Americans: Historical and Contemporary
Spring. 3 credits. P. Kaurouma.
This is a course will be devoted to the history of Black education along with contemporary issues in Black education, such as the struggle for Black Studies, the development of independent Black schools, and problems of public schools in Black communities.

AS&RC 191 Africa: The Continent and Its People
Fall. 3 credits. L. Edmondson.
An introductory interdisciplinary course focusing on African geographical, ecological, and demographic characteristics; indigenous institutions and values; the triple cultural heritage of Africanity, Islam, and Western civilization; main historical developments and transitions; contemporary political, economic, social, and cultural change. Africa's ties with the United States (from trans-Atlantic slavery to the present), its impact on the emerging world order, and its contribution to world civilization will also be explored.

AS&RC 202 Swahili Literature
Fall. 4 credits. Prerequisite: Swahili 134. A. Nanji.
Students gain mastery over spoken Swahili and are introduced to the predominant Swahili literary forms.

AS&RC 203 Sec 01 Intermediate Yoruba (also YORUB 203)
Spring. 3 credits. Prerequisite: AS&RC 123, Sec. 01. V. Carstens and staff. Intermediate conversation, grammar and composition.

AS&RC 203 Sec 02 Intermediate Mandinka (also MANDI 203)
Spring. 3 credits. Prerequisite: AS&RC 123, Sec. 01. Not offered 1995–96; next offered spring 1997.
Intermediate conversation, grammar and composition.

AS&RC 204 History and Politics of Racism and Segregation
Fall. 4 credits. Not offered 1995–96; next offered fall 1996. S. Greene.
The course will deal with historical and/or contemporary patterns of racism and segregation using South Africa and the United States as case studies. The study will be undertaken within a theoretical framework that broadly defines racism and segregation and their implication.

AS&RC 205 African Civilizations and Culture
Spring. 3 credits. D. Ohadike.
May be used for history requirement. This course is concerned with the development of African civilizations and cultures from the earliest times to the present day, together with their contributions to world history. The aim is to promote the understanding of Africa and the appreciation of its cultural forms through the study of the continent's social, political, and economic structures. The approach is multidisciplinary. The course deals with the civilizations of North Africa, the Nile Basin, Ethiopia, (examples: Carthage, Egypt, Kush, and Meroe); and the kingdoms and empires of Sub-Saharan Africa (examples: Ancient Ghana, Mali, Songhia, Oyo, Benin, Kong, and Nwene Mutapa); African kinship systems; religions; healing systems, music, dance, political philosophy, and mechanisms of social control. The course also looks at the impact of Islam and Christianity on the development of African cultures.

AS&RC 211 West Indian Literature from Abroad
Spring. 3 credits. Not offered 1995–96; future semester offering TBA. A. Adams.
"Writing home": writing by West Indians who have emigrated to North America, Europe, or Africa, but whose cultural, social, psychological, spiritual center of gravity remains the Caribbean (or its transplanted manifestation in the new domicile). Whether experienced as "exile," as with Laming, "loneliness," as with Selvon, or as a search for the diaspora connection with the continent of ancestry, as with Conde, the West Indian literary artist abroad is, in some form, "writing home."
(also Women's Studies 220) @
3 credits. Not offered 1995-96; future semester offering TBA.
N. Assie-Lumumba.
This course deals with women of Africa and of the African diaspora in liberation movements. The themes will include anti-slavery struggles in the Americas and the Caribbean, anti-colonization and decolonization movements, and anti-apartheid struggles in Africa. These movements, the women who participated in them, and especially the women who led them will be discussed within the broader historical, socio-economic, political, and cultural contexts. The women leaders to be studied include: Sojourner Truth, Harriet Tubman, Ida B. Wells-Barnett, and Angela Davis, Nzinga, Dona Beatrice, Yaa Asantewa, Nehanda, Nanny, Albertina Sisulu, and Winnie Mandela.

[AS&RC 231] African American Social and Political Thought
Spring. 3 credits. J. Turner.
This is an introductory course that will review and analyze the major theoretical and ideological formulations developed and espoused by African-Americans in the struggle for liberation. This semester we will focus specifically on the African-American philosophies and historical significance of Malcolm X, and the work and movement of Marcus Garvey, as the prime movers of nationalism and pan-Africanism among Black people in this century. Such themes as slave resistance, nationalism, Pan-Africanism, emigration, anti-imperialism, socialism and internal colonialism, and the political and social views of Black women will be discussed. Black political thought will be viewed in its development as responses to current conditions of oppression and expression.

[AS&RC 271] Introduction to African Development (also CRP and Government 271) @
For description, see CRP 271.

[AS&RC 280] Racism in American Society
Fall. 3 credits. D. Barr and J. Turner.
This course will be a topical treatment of the history and theory of racism in the United States. The course will begin with an examination of basic concepts and theories of racism. From there we will examine the history of racial groups in America, African-American, Native Americans, Asian Americans, and the Hispanic groups. Particular attention will be paid to the political economy of racism and the sociological and the psychological aspects of race relations in America, with specific reference to the differences and intersections of race, class, gender, and ethnicity.

[AS&RC 285] Black Theater and Dramatic Literature
Fall. 3 credits. TBA.
This course is an introduction to the history and literature of African American Drama at times incorporating drama from other parts of the African diaspora. It also provides an opportunity for students to cultivate an interest in individual and group presentation of Black dramatic materials. Students who successfully complete this course will be granted preference for the limited enrollment in AS&RC 425 (Advanced Seminar in Black Theatre and Dramatic Literature), which produces a public performance in the spring.

Fall. 3 credits. J. Turner.
This is an introduction to the field of Africana Studies. It assumes a historical/sociological approach to the examination of the African-American experience. The course surveys the African beginnings of human kind and the classical role of Black people in world civilization and the making of early culture. The course treats issues in the humanities, social sciences, and history. This course is required for all undergraduate students majoring at the Africana Center.

[AS&RC 301] Psychological Aspects of the Black Experience
Spring. 4 credits. Not offered 1995-96; future semester offering TBA.
This advanced undergraduate course highlights different aspects of the black experience. In recent years, it has centered on oppression and the psychology of Black social movements; however in the future the course theme may change from time to time.

[AS&RC 303] Blacks in Communication Media
Spring. 3 credits. Not offered 1995-96.
Instructor: TBA.
The focus is on the general theory of communications, the function of media in an industrialized society, and the social, racial, and class values implied in the communication process. There is a term paper, and the screening of significant American and Third World films.

[AS&RC 304] African American Art
Spring. 3 credits. S. Hassan.
This course investigates the different forms of African American visual artistic traditions in relation to their historical origins and socio-cultural context from the early days of slavery to the present time. The course will start with an overview of African art and the experiences of the Middle Passage and slavery in relation to African American traditions in the decorative arts including: pottery, architecture, ironwork, basketry. This is followed by a fine art survey starting with the eighteenth and nineteenth centuries, continuing through the early twentieth-century Harlem Renaissance up to the present. Certain issues related to African American arts and creativity such as "improvization," "Black Aesthetic," and "Pan Africanism" will also be explored. Slides, films, film strips will be used extensively to illustrate topics discussed. Visits to museums and relevant current exhibitions may be arranged.

[AS&RC 310] Art in African Culture and Society @
Fall. 3 credits. S. Hassan.
This course is a survey of the visual art and material cultural traditions of sub-Saharan Africa. It aims at investigating the different forms of visual artistic traditions in relation to their historical and sociocultural context. The symbolism and complexity of traditional African art will be explored through the analysis of myth, religion, and economy. In-depth analysis of particular African societies will be used to examine the relationship of the arts to indigenous concepts of time, space, color, form, and sociopolitical order. New and contemporary art forms associated with major socioeconomic changes and processes of assimilation and acculturation will also be explored. These include tourist art, popular art, and elite art.

[AS&RC 311] Government and Politics in Africa @
Fall. 3 credits. Not offered 1995-96.

[AS&RC 361] Introduction to African American History (from African Background to the Twentieth Century) @
3 credits. Not offered 1995-96; future semester offering TBA.
Instructor: TBA.
This course surveys the transition of Africans to America through the process of enslavement and their transformation into African Americans. Explores the transition from slavery to freedom through the processes of emancipation and the transformation of African Americans from chattel slaves into rural peasants. Its purpose is to understand the internal dynamics of the Black experience from African origins to the age of segregation.

[AS&RC 370] African American History: The Twentieth Century
Spring. 3 credits. R. Harris.
Examines the transition of African Americans from countryside to city through the process of migration and urbanization and their transformation into industrial laborers. Probes the transition from segregation to civil rights through the process of protest and the transformation of African Americans from second-class into first-class citizens. The purpose is to understand historical antecedents for the current socioeconomic, political, and cultural status of African Americans.

[AS&RC 380] African History: Earliest Times to 1800 @
Fall. 3 credits. S. Greene.
This course covers the history of Africa from the origins of humankind, through the emergence of small-scale societies and state systems, such as Egypt, Meroe, Mali, Bunyoro, the Swahili city-states and the Luba-Lunda complex, that had regional and international significance. Emphasis is placed on understanding the way in which historic ecological conditions, political developments, and religious change affected gender, class, and ethnic relations within these societies and their relations with other societies. The course also examines Africa's interaction with Islamic and European cultures up to 1800.
American political practice and theoretical development since the seventeenth century is a complex political legacy. This course will conduct a close study of African American political and democratic access and human rights.

The central thesis of African American politics is that the socioeconomic conditions of the African American urban community nationally will be examined. With such great focus, both inside and outside Africa, on issues of Africa's "development," the African American dramatic literature. Students will participate in all the various phases and aspects of a play or plays drawn from the annals of African literature influencing or influenced by the mundane realities of daily living faced by African people? Or does African literature concern itself with philosophical ideas and ideas that transcend those realities to embrace the general human condition? Or, does it do both? The texts that we will be reading this course will be approached in terms of these issues of "African development" and "the universal human experience."

The socioeconomic conditions of the African American urban community will be the central focus of the course. Community development models will be explored in relationship to the social needs of the African American population. The changing configuration of internal organization of the African American community nationally will be examined.

May be used for Humanities Requirement. With such great focus, both inside and outside Africa, on issues of Africa's "development," what place does "literature" take? Is African literature influencing or influenced by the mundane realities of daily living faced by African people? Or does African literature concern itself with philosophical ideas and ideas that transcend those realities to embrace the general human condition? Or, does it do both? The texts that we will be reading this course will be approached in terms of these issues of "African development" and "the universal human experience."

This course offers an overview of African American dramatic literature, 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 II to the present.

This course offers an overview of African American dramatic literature. It surveys historically the evolution of African cinema from its early days to the present. Through screening of selected African films, different trends within African cinema will be explored, such as "Return to the Sources" and the rediscovery of the pre-colonial past; the "Social Realist" narrative and critique of post-independence Africa; reconstructing the story of colonialism from the perspective of the colonized; and the entertainment genre. Techniques, style, and aesthetics of African cinema will also be discussed, in relation to the unique opportunity of looking at African culture and society, and at issues of social change, gender, class, tradition, and modernization through African eyes.

A study of the historical, geostategic, political, economic, and social (including racial and cultural) forces bearing on the domestic and international experiences of Caribbean societies. Special attention will be given to conflicting interpretations of the Caribbean, contesting theories of Caribbean social structure and models of development; the continuing salience of struggles for change and transformation; prospects of regional integration; and Caribbean challenges to the global system, especially with regard to the region's relations with the United States and the region's position in the Third World in the context of the North-South cleavage.

This course will examine the prose literature of the Caribbean islands. Through the reading of several novels and short stories from the various languages and cultural strains that comprise the Caribbean societies, students will study the points of commonality and the diversity within this body of literature. The recurrence of certain historical, social, and cultural issues that have formed the multi-ethnic Caribbean peoples will be analyzed in their varying manifestations across the linguistic and other boundaries to uncover the underlying shared experience.

This course deals with theories and concepts of planned change for social development and their application to educational innovations geared to promoting equal opportunity based on gender, race, and class in Africa and the African diaspora. The first part of the course will be concerned with the stage of innovations from their inception to their implementation, resistance, diffusion and impact on different social categories. The second part of the course will deal with concrete cases of educational innovations such as the creation of educational institutions and change in curriculum development and teacher instruction. Historical and contemporary cases of educational innovations will be presented and analyzed. The case studies include the development of African Studies as a discipline, the creation and expansion of historically black institutions such as Lincoln University in Pennsylvania, Tuskegee Institute in Alabama, Spelman College in Georgia, and the Westside Preparatory School of Chicago. The African cases to be studied include education for self-reliance in Tanzania, African languages as a medium of instruction in Nigeria and Mali, and television as a medium of instruction in Cote d'Ivoire. Gender will be a main focus in the analysis of the agents and beneficiaries of the innovations.

The family as a social institution is structured according to socio-economic, historical, political, and cultural specificities. The topics to be discussed include the concepts of nuclear and extended family, the place and role of different age-groups and generations in the family, marriage and related issues, such as dowry, divorce, parenthood, childrearing, gender roles, class differences, "family planning." The course also deals with the impact of westernization, urbanization, and modern economy on the structure of the family in Africa. Finally, the course addresses the legacy of African family values in the African diaspora. Male and female roles will be drawn from urban and rural communities.

There are two contrasting views of the status and role of women in Africa. One view portrays African women as dominated and exploited by men. According to another view women have a favorable social position in Africa: indigenous ideologies consider women to be the foundation of society, economically active and independent, possessing an identity independent of men. In this seminar we will discuss the status and role of women in Africa historically as well as in the contemporary period. Among the topics to be covered are: women in non-westernized/pre-colonial societies, the impact of colonial policies on the status and position of women, gender roles and development, women's participation in the economy and politics, the attitudes of African women toward feminism, and the 1985 NGO and the United Nations Nairobi Conferences on women.
The objective of the course are to review how African aesthetics has been studied to date, to provide a critical analysis of the different approaches to the subject and related issues, and to suggest future directions of research. In-depth analysis of particular African societies will be used to examine the relationship of arts and aesthetics to indigenous concept of time, space, color, form, and sociopolitical order. In addition, issues related to African aesthetics and arts such as style, gender, class, and social change will also be explored.

The concentration draws upon courses in several colleges—particularly, the Colleges of Arts and Sciences, Agriculture and Life Sciences, and Human Ecology. The concentration is administered by a committee, the members of which are drawn from the faculty associated with the concentration. The members of this committee include faculty from each of the major colleges from which courses in the concentration are drawn. The work of the committee is supported administratively through the Biology and Society Major. The office of the Biology and Society Major (275 Clark Hall) also provides a central location for students to receive information about relevant course offerings, upcoming seminars and presentations, faculty interests, and so on.

Basic Requirements
The requirements for the Agriculture, Food, and Society concentration are designed to ensure a broad background in the biological, socioeconomic, and humanistic dimensions of agricultural and food issues. These requirements include foundation courses in biology, the Senior Seminar in Biology (B&soc/S&TS 469), Agriculture, Food, and Society; plus a minimum of five electives totaling 15 credits drawn from the courses offerings.

Students enrolling in the Agriculture, Food, and Society concentration should take the following foundation courses in biology to prepare themselves for course work in agricultural science: a two-semester introductory biology sequence selected from Biological Sciences 109/110, 105/106, or 101–104. (Advanced placement in biology with a score of 4 or 5, or Biological Sciences 107/108, offered during the eight-week Cornell summer session, also satisfies the biological sciences requirement). These courses may be used to meet group 1 (physical or biological science) and distribution requirement in the College of Arts and Sciences.

It is recommended (but not required) that students in the Agriculture, Food, and Society concentration elect one or more freshman writing seminars with agriculturally related content to meet basic college requirements for graduation. The electives for the concentration, from which a minimum of five courses and 15 credits must be taken, are organized into three groups: agricultural and nutritional science, humanities, and social science/history. Students must select one agricultural and nutritional science course, one humanities course, and three social science or history courses. A maximum of 10 credits may be earned in 100-level courses.

In addition, students are required to take the senior seminar, B&soc/BioSci/S&TS 469, Agriculture, Food and Society. Adjustments to these and other requirement of the concentration may be made with the approval of the student's Agriculture, Food, and Society faculty adviser.

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AS&RC 483 Themes in African History @ 
TBA. 4 credits.

AS&RC 498-499 Independent Study
Hours to be arranged. 498-fall; 499-spring. Africana Center faculty. For students working on special topics, with selected reading, research projects, etc., under the supervision of a member of the Africana Studies and Research Center faculty.

AS&RC 501 Global Africa: Comparative Black Experience @

AS&RC 502 Education and Development in Africa @
Spring. 4 credits. N. Assie-Lumumba.

AS&RC 503 African Aesthetics @
Fall. 4 credits. S. Hassan.

AS&RC 510 Historiography and Sources: The Development of African-American History
Spring. 4 credits. Prerequisite: upperclass or graduate standing or permission of instructor. R. Harris.

AS&RC 530 Womanist Writing in Africa and the Caribbean @
Fall. 4 credits. Not offered 1995–96; future semester offering TBA. A. Adams.

AS&RC 571 Graduate Seminar in Black Psychology
Fall. 4 credits. Prerequisite: permission of instructor. Not offered 1995–96; future semester offering TBA.

AS&RC 598-599 Independent Study
598-fall; 599-spring. Variable credit.

AS&RC 698-699 Thesis
698, fall; 699, spring. Limited to Africana Studies and Research Center graduate students.

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Agriculture, Food, and Society Concentration

Agriculture, Food, and Society is an interdisciplinary concentration that is designed to introduce students to the study of agricultural and food issues from diverse perspectives within the liberal arts. The Agriculture, Food, and Society concentration seeks to make available to students a coherent program of study in which the role of agriculture in modern or prehistorical-historical and developed or developing societies can be understood in biological, social, scientific, and humanistic perspective. The concentration draws upon courses in several colleges—in particular, the Colleges of Arts and Sciences, Agriculture and Life Sciences, and Human Ecology.
American Indian Program
Jane Mt. Pleasant, Director
(300 Caldwell Hall, 255-5587)
The American Indian Program (AIP) is a multidisciplinary, intercollege program consisting of academic, research, extension, publications and student support components.

Academic component. The AIP includes a range of courses that enhance students' understanding of the unique heritage of North American Indians and of their relationship to other peoples in the United States and Canada. Students are challenged by such topics as the sovereign rights of Indian nations and the contemporary relevance of Indian attitudes toward the environment. The program's instructional core consists of courses focusing on American Indian life from pre-contact times to the present and from the perspectives of native people as much as is possible. Core courses are supplemented by a variety of offerings in several different departments.

Concentration. The AIP offers a concentration in American Indian Studies to undergraduate students in conjunction with their majors defined elsewhere in the university. The minor in American Indian Studies will be upon completion of five courses—Sociology 100 (Introduction to American Indian Studies) and Rural Sociology 175 (Issues in Contemporary American Indian Societies) plus three other courses selected from the AIP course listing below—for a total of at least 15 credits. Students choosing a concentration in American Indian Studies should consult with the AIP's Director of Undergraduate Studies: D. H. Usner, Department of History, 322 McGraw, 255-6753.

Student support. The student support staff assist Native American students in completing an enriched Cornell education by coordinating academic tutoring, financial aid, personal counseling, and other student services. Akwe:kon, the American Indian Program residence house, is one option available for students interested in a living environment that promotes intercultural exchange.

Research. Research priorities include Indian education, social and economic development, agriculture, environmental issues, literature and the arts, and cultural preservation. This research, which has serious implications in Indian communities, will be of interest to non-Indian and Indian graduate students.

Outreach. The AIP's Outreach unit seeks to develop solutions to problems identified by Indian communities. In this way the AIP can facilitate the application of institutional expertise and resources to community needs.

Publications and public relations. AIP publishes its own multidisciplinary journal, Native Americas, and sponsors conferences, guest lectures, and forums on important local, national, and international Indian issues. AIP also contributes articles and information to the national Indian press.

COURSE OFFERINGS
Course offerings vary from year to year. For full descriptions and schedules of courses, consult the individual departmental listings and the American Indian Program. The following courses are offered, or have been offered in the past:

- ANTHR 230 Cultures of Native North America
- ANTHR 354 The Peopling of America
- ANTHR 665 Native American Contributions to Anthropological Thought
- ARCH 398/CRP 495 American Indian Landscape, Architecture, and Planning
- CRP 360/666 Pre-industrial Cities and Towns of North America
- CRP 363/547 American Indians, Planners, and Public Policy
- ENGL 260 Introduction to American Indian Literature
- ENGL 269 Topics in American Indian Literature
- ENGL 278 Native American Poetry
- ENGL 683 Trickster in American Indian Literature and Culture
- ENGL 668 Culture Studies: Native American Literature
- ENGL 669 Critical Approaches to American Indian Autobiography
- ENGL 687 American Indian Literature: Issues of Transition, Collaboration, and Alternate Discourse
- HIST 209 Political History of American Indians in the United States
- HIST 276 American Indian History, 1500–1850
- HIST 277 American Indian History since 1850
- HIST 370 Resistance and Adaptation: Native American Responses to the Conquest
- HIST 429 American Indians in the Eastern United States
- HIST 624 Graduate Seminar in American Indian History
- R SOC 100 Introduction to American Indian Studies
- R SOC 175 Issues in Contemporary American Indian Societies
- R SOC 318 Ethnohistory of the Iroquois
- R SOC 440 Social Impact of Rapid Resource Development
- R SOC 442 American Indian Philosophies: Selected Topics

Independent Study
Independent study courses can be arranged with American Indian Studies faculty in their respective departments.

American Studies

The Major
The major in American Studies, appropriate for a wide variety of future professions, is basically a program of coordinated study in the history, literature, and politics of the United States. The courses are from the following: American Studies 101, American Studies 102, English 275, English 268, Government 111. Students who contemplate becoming American Studies majors are encouraged to speak with the chair as early as possible to arrange for a major adviser.

In consultation with their advisers, American Studies majors elect, in addition to the prerequisites, 36 credits (or nine courses) of work in American history, American literature, and American government. Their work must include courses in all of the three three periods into which the nation's development can be divided (defined for the purposes of the program as colonial, nineteenth century, and twentieth century). To gain both breadth and depth, they select an area of concentration either a single period (or the connections between two of the periods) and take 1) at least 16 credits in one period and at least 8 credits in each of the other two, or 2) at least 12 credits in each of the two other periods. Whose connections constitute the focus of the study and at least 8 credits in the third. Each student must take one of the adviser-approved 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 divide their work among history, literature, and politics in whatever proportion serves their interests, so long as their advisers consider their programs to be well-balanced. No more than 18 credits may be in any one department.

Beyond the basic core requirements for the major, 8 credits of work in the history or literature or both of another culture are required; students are also encouraged to take at least 4 credits in American thought, society, or culture studies from the perspective of another discipline such as anthropology, economics, history of art, or sociology. (This last 4-credit supplement may be satisfied outside the college.)

Courses in American history that will satisfy the 36-credit requirement 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; those in American government are offered in the Department of Government. Occasionally a course that fits an individual student's program may be offered elsewhere. Substitution will depend on the adviser's approval. Advisers determine what courses count for the interdisciplinary seminar.

Honors. Candidates for honors must maintain an average of B+ in courses pertinent to the major. To be eligible for a degree with honors in American Studies, a student must in the senior year write an honors essay for American Studies 493, Honors Essay Tutorial, and take an oral examination in the declared area of special interest.

Cornell-in-Washington Program. American Studies majors may apply to the Cornell-in-Washington program to take courses and participate in a closely supervised externship during a fall or spring semester. For further
information, see Interdisciplinary Centers, Programs, and Studies or inquire at 131 Sage Hall, 255-4090.

[AM ST 101] Introduction to American History (also History 101)
Fall. 3 credits. Not offered 1995-96.

[AM ST 102] Introduction to American History (also History 102)
Spring. 3 credits. Not offered 1995-96.

[AM ST 201] Popular Culture in the United States 1900-1945
Fall. 4 credits. M W F 11:15-12:05.
G. Altschuler.
American Studies 201 will deal with American popular culture in the period between 1900 and the end of World War II. As we examine best-sellers, films, sports and television, radio, ads, newspapers, magazines and music, we will try to better understand the ways in which popular culture shapes and/or reflects American values. The course will also depict popular culture as “contested terrain,” the place where social classes, racial and ethnic groups, women and men, the powerful and the less powerful, seek to “control” images and themes. Topics for 201 include: the Western; Cultural Heroes and the Cult of Individualism in the 1920s; The Hays Code and the Black Sox Scandal; Mae West and the “New Women”; Advertising in an Age of Consumption; Gangsters and G-Men; Jackie Robinson and the American Dilemma.

[AM ST 202] Popular Culture in the United States 1945 to Present
Spring. 4 credits. TBA. G. Altschuler.
American Studies 202 will treat the period from 1945 to the present. As we examine best-sellers, films, sports and television, radio, ads, newspapers, magazines and music, we will try to better understand the ways in which popular culture shapes and/or reflects American values. The course will also depict popular culture as “contested terrain,” the place where social classes, racial and ethnic groups, women and men, the powerful and the less powerful, seek to “control” images and themes. Topics for 202 include: The “Honeymoovers” and 1950’s Television; soap operas; “Gross-out” movies; Elvis, The Beatles, and Guns’n’Roses; Gothic Romances; People Magazine and USA Today.

[AM ST 250] Historical Development of Women as Professionals, 1800 to the Present (also Human Development and Family Studies 258, History 238, and Women Studies 238)

[AM ST 262] Asian American Literature (also English 262 and Asian American Studies 262)
Fall. 3 credits. 10:10-11:25. S. Wong

[AM ST 275] The American Literary Tradition (also English 275)
For description, see ENGL 275.

[AM ST 276] Literature in Cold War Culture, 1945-1960 (also English 276)

[AM ST 291] American 1920s: Literature and Culture (also English 291)
Spring. 3 credits. TBA. B. Maxwell.

[AM ST 302] Social Movements in American Politics (also Government 302)
Fall. 4 credits. T R 10:10-11:25.
E. Sanders.

[AM ST 304] American Culture in Historical Perspective (also History 304)
Fall. 4 credits. M W F 1:25-2:15.
M. Kamen.

[AM ST 311] Structure of American Political History (also History 311)

[AM ST 312] Structure of American Political History (also History 312)

[AM ST 316] The American Presidency (also Government 316)
Spring. 4 credits. TBA. E. Sanders.

[AM ST 330] The Age of Jackson, 1815-1850 (also History 330)

[AM ST 331] American Civil War and Reconstruction, 1850-1877 (also History 331)

[AM ST 332] The Urbanization of American Society: 1600 to 1860 (also History 332)

[AM ST 333] The Urbanization of American Society: 1860 to 2000 (also History 333)

[AM ST 336] The American Ethos of Entrepreneurialism: Capitalism and Society in Developing America, 1800-1900 (also History 336)

[AM ST 337] Entrepreneurialism and Organization in the Age of the Corporation: Capitalism and Society in Modern America, 1840-2000 (also History 337)
Spring. 4 credits. TBA. S. Blumin.

[AM ST 345] Intellectual/Cultural Life of Nineteenth-Century Americans (also History 345 and Religious Studies 345)
Fall. 4 credits. M W F 12:20-1:10.
R. L. Moore.

[AM ST 346] Modernization of the American Mind (also History 346)
Spring. 4 credits. TBA. R. L. Moore.

[AM ST 359] American Families in Historical Perspective (also Human Development and Family Studies 359, Women Studies 357, and History 359)

[AM ST 361] Early American Literature (also English 361)
Spring. 4 credits. TBA. S. Samuels.

[AM ST 362] The American Renaissance (also English 362)

[AM ST 365] American Literature Since 1945 (also English 365)

[AM ST 366] The Nineteenth-Century American Novel (also English 366)
Fall. 4 credits. T R 10:10-11:25.
S. Samuels.

[AM ST 367] The Modern American Novel (also English 367)

[AM ST 374] 19th Century American Women Writers (also English 374 and Women’s Studies 374)
Fall. 4 credits. T R 8:40-9:55.
L. Brown.

[AM ST 376] American Political Thought from Madison to Malcolm X (also Government 366)
Spring. 4 credits. TBA. I. Kramnick.

[AM ST 398] Independent Research
Fall and spring. 1-4 credits. By permission only. J. Porte.

[AM ST 399] Readings in American Studies
Fall and spring. 1-4 credits. By permission only. J. Porte.

[AM ST 411] Seminar: American Political History (also History 411)

[AM ST 417] History of Female Adolescence (also Human Development and Family Studies 417, Women Studies 438 and History 458)
Spring. 3 credits. TBA. J. Brumberg.

[AM ST 419] Seminar in American Social History (also History 419)

[AM ST 442] Religion and Politics in American History from J. Winthrop to R. Reed (also History 442 and Religious Studies 442)
Fall. 4 credits. T 2:30-4:25.
R. L. Moore.

[AM ST 465] Proseminar in American Studies (also English 465)

[AM ST 470] Studies in the Novel (also English 470)
Fall. 4 credits. T R 2:55-4:10.
D. McCall.

[AM ST 479] Jewish-American Writing (also English 479 and Jewish Studies 478)

[AM ST 485] American Modernist Writing (also English 485)

[AM ST 489-494] Honors Essay Tutorial
493. Fall. 494. Spring. Up to 4 credits each semester. See J. Porte for appropriate advisers.

[AM ST 500] Research Seminar in American Studies (also History 500)
For description, see HIST 500.

[AM ST 521] Seminar in American Cultural Studies (also History 521)
Fall. 4 credits. T 2:30-4:25.
M. Kamen.

[AM ST 665] American Political Thought (also Government 665)
Spring. 4 credits. TBA. I. Kramnick.

Center for Applied Mathematics
The Center for Applied Mathematics administers a broadly based interdepartmental graduate program that provides opportunities for study and research over a wide range of
the mathematical sciences. This program is based on a solid foundation in analysis, algebra, and methods of applied mathematics. The remainder of the graduate student's program is designed by the student and his or her Special Committee. For detailed information on opportunities for graduate study in applied mathematics, students should contact the director of the Center for Applied Mathematics, 657 Engineering and Theory Center.

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

A listing of selected graduate courses in applied mathematics can be found in the description of the center in "Interdisciplinary Centers, Programs, and Studies."

Asian American Studies Program
The Asian American Studies Program is a university-wide academic program housed administratively within the College of Arts and Sciences. Its aim is to promote teaching, research, and educational activities related to Asian Americans and to serve as a resource to the campus and regional communities. The program's undergraduate courses, offered within the program and cross-listed with departments in various colleges, meet distribution requirements and count toward a concentration in Asian American Studies. The program does not offer a graduate course of study, but students can undertake graduate work in Asian American Studies within selected disciplines of the university.

Undergraduate Concentration
The program's undergraduate concentration affords students an opportunity to develop a multidisciplinary approach to the study of Asians in America. The course of study stresses developments within the United States, but also underscores the transnational and comparative contexts of Asian America and the field's connections with African American, American Indian, Latino, and Women's Studies. Students must work with a faculty adviser from among the program's affiliated faculty and must complete at least fifteen (15) units of credits as follows: (a) AAS 110 and two (2) additional courses in Asian American Studies; (b) one (1) course in Africana, American Indian, Hispanic American, or Women's Studies; and (c) one (1) course in East Asian, South Asian, or Southeast Asian Studies. (*Must be approved by the student's faculty adviser, and they should address issues of race, gender, or the histories and cultures of Asian peoples.) Students must file an application for the concentration with the Asian American Studies Program.

Resource Center
The program's Asian American Studies Resource Center provides meeting space for the more than twenty-five undergraduate student organizations of the Cornell Asian Pacific Student Union and the graduate student Asian Pacific American Graduate Association. It also holds a modest print collection of books, periodicals, and newspa-

pers; a current news clip file; a comprehensive data base of publications on Asian Americans since 1977; and a sizable collection of videotapes on the Asian American experience.

Research
The program encourages faculty and student research on Asian Americans by sponsoring guest lectures, conferences, film festivals, readings, and exhibits. It also funds research projects and student travel to conferences and research sites. The Asian American Studies Workshop is the program's principal research initiative, engaging Cornell's faculty and students with invited faculty from other universities in the year-long intensive study of selected themes.

Affiliated Faculty
Gary Y. Okhiro, director; T. Chaloemtirarana (Southeast Asia Program), P. Chi (Consumer Economics and Housing), B. de Bary (Asian Studies), J. V. Koschmann (History), L. C. Lee (Human Development and Family Studies), D. R. McCann (Asian Studies), H. Mullen (English), V. Munasinghe (Anthropology), V. Nee (Sociology) G. Okhiro, (History), R. E. Ripple (Education), N. Sakai (Asian Studies), P. S. Sangren (Anthropology), K. W. Taylor (Asian Studies), S. Wong (English)

Courses
AAS 350 Introduction to Asian American Studies
Spring. 3 credits.
Interdisciplinary, cross-cultural introduction to Asian American Studies focusing on contemporary issues. Major themes include: identity and stereotypes, gender, family, community, education, migration and labor, and anti-Asianism. Coverage will be given to both Hawaii and the U.S. mainland, and to Asian Indians, Chinese, Filipinos, Hawaiians, Japanese, Koreans, and Southeast Asians.

AAS 213 Asian American History
For description, see HIST 213

AAS 262 Asian American History
For description, see ENG 262

AAS 303 Asians in the Americas: A Comparative Perspective (also Anthropology 303)
Fall. 4 credits.
The common perception of ethnicity is that it is a "natural" and an inevitable consequence of cultural difference. "Asians" overseas, in particular, have won respect as a people who cling tenaciously to their culture and refuse to assimilate into their host societies and cultures. But, who are the "Asians"? On what basis can we label Asians an ethnic group? Although there is a significant Asian presence in the Caribbean, the category "Asian" itself does not exist in the Caribbean. What does this say about the nature of categories that label and demarcate groups of people on the basis of alleged cultural and phenotypical characteristics? This course will examine the dynamics behind group identity, namely ethnicity, by comparing and contrasting the multicultural experience of Asian populations in the Caribbean and the United States. Ethnographic case studies will focus on the East Indian and Chinese experiences in the Caribbean and the Chinese, Korean, Japanese, Filipino, and Indian experiences in the United States.

SPECIAL PROGRAMS AND INTERDISCIPLINARY STUDIES

AAS 350 The Art and Politics of Defining the Self in Media Images (also Theatre Arts 350)
Spring. 3 credits. Not offered 1995-96. The focus of this course is an exploration of the way films deal with the representation of people of poor within the American experience. Through the analysis of selected films and class discussions we will explore filmic representations of history, culture, class, gender, and identity.

AAS 412 Undergraduate Seminar in Asian American History (also History 412)
Spring. 4 credits.
A reading and research seminar that will cover various topics in Asian American history. The topic will be the idea of the "yellow peril" in European and American thought.

AAS 435 American Images in Film
3 credits.
Prerequisite: AAS 110 or permission of instructor. Not offered 1995-96. Examination of images of Asians in American film and television productions within their historical and socio-cultural contexts. Use of film and media theory to assess the impact of those images on both Asian and non-Asian American viewers. Students will be challenged to create, in video or on paper, images that avoid stereotypes and depict more realistically the Asian American experience.

AAS 465 Identity and Personality (also HDFS 465)
Spring. 3 credits.
The seminar will review psychological theory and research dealing with Asian Americans. Topics such as family and kinship patterns, personality and identity issues, academic performance and achievement, immigration and adjustment, etc., will be examined within the context of the various Asian ethnic cultures and American society.

AAS 478 Self and Nation in Asian-American Literature (also English 478)
Not offered 1995-96. A study of the ways in which Asian American writers have constructed discourses of self and nation. Topics will include nationalism, feminism, identity politics, and theories of minority discourse. In our reading of selected works of prose, poetry and drama by Chinese American, Filipino American, Japanese American, and Korean American writers, we will be asking questions about the relation of these works to the moment of their production and reception, and the manner in which these textual representations engage with shifting cultural and political struggles. Writers under discussion may include: Carlos Bulosan, Theresa Hak Kyung Cha, Frank Chin, Jessica Hagedorn, David Henry Hwang, Maxine Hong Kingston, Joy Kogawa, David Mura.

AAS 495 Independent Study
Fall or spring. 1-4 credits.
Topic and credit hours to be mutually arranged between faculty and student. Independent Study Forms must be approved by Asian American Studies Program Office.

Biology and Society Major
S. Jasanoff, chair; S. Hilgartner, director of undergraduate studies, colleges of Arts and Sciences and Agriculture and Life Sciences; S. K. Obendorf, advising coordinator, College
of Human Ecology; D. Bates, B. Bedford,
C. Bispigni, R. Boyd, U. Bronfenbrenner,
emeritus; R. Canfield, S. Ceci, B. Chabot,
C. C. Chu, T. Dawson, P. Dear, C. Eberhard,
G. W. Evans, G. W. Feigenson, J. Ford,
J. Fortune, C. Geiser, K. Graziar, C. Greene,
D. Gurak, J. Haas, A. Hedge, S. Hilgartner,
R. Howarth, H. C. Howland, K. A. R. Kennedy,
B. Knuth, A. Lemley, D. Levitsky,
B. Lewenstein, R. A. Lewis, J. Fessenden
MacDonald, A. Marshall, J. Mueller, N. Noy,
L. Palmer, A. Parrot, D. Pimentel, T. Pinch,
A. G. Power, W. Provine, S. Robertson,
M. Rossiter, P. Schwartz, J. Shanahan,
M. Small, N. Sturgeon, J. M. Stycos, P. Taylor,
V. Utermohlen
The biology and society major is ideally suited for students who wish to combine training in biology with exposure to perspectives from the social sciences and humanities on the social, political, and ethical aspects of modern biology. In addition to providing foundational training in basic biology, biology and society students obtain background in the social dimensions of modern biology and in the biological dimensions of contemporary social issues.

The biology and society major is offered to students enrolled in the College of Arts and Sciences and the College of Human Ecology. Undergraduates in the College of Agriculture and Life Sciences can develop an approved sequence of courses from the biology and society curriculum under general studies. The major is coordinated for students in all colleges through the biology and society office. Students can get information, specific course requirements, and application procedures for the major from the undergraduate records office in 275 Clark Hall

Because the major is multidisciplinary, students must attain a basic understanding of the several disciplines it comprises. The curriculum includes courses in ethics, mathematics, statistics, history, philosophy, and social studies of science and biology, and basic biology (e.g., genetics and development, biochemistry and molecular-cell biology; ecology, evolutionary biology) as well as integrative courses offered through Biology and Society. In addition, majors are required to take a core course and must develop a theme: a coherent and meaningful grouping of courses representative of their special interest in biology and society. Students should develop the theme and select the courses in consultation with a member of the Biology and Society faculty. Courses must be above the 100 level, at least 3 credits, and taken for a letter grade if used to fulfill a major requirement.

There are student advisers and faculty available (according to posted office hours or by appointment) in the Biology and Society offices, 275 Clark Hall or 278 Clark Hall, to answer questions and to provide assistance.

Admission to the Major
All students should have completed a year of college-level biology and submit an application during their sophomore year. Juniors are considered on a case-by-case basis. Upper-division applicants should realize the difficulties of completing the major requirements in fewer than two years. The application includes (1) a one-page statement explaining the student's intellectual interests in

the biology and society major and why the major is consistent with the student's academic goals and interests; (2) the theme the student wishes to pursue in the major; (3) a tentative plan of courses fulfilling biology and society requirements, including courses taken and those the student plans to take; and (4) a transcript of work taken at Cornell University and elsewhere if applicable, current as of the date of application.

Acceptance into the major requires completion of the course sequence in introductory biology. Sophomores in the process of completing this prerequisite may be admitted to the major on a provisional basis. It is the student's responsibility to assure that final acceptance is granted on satisfactory completion of the introductory biology sequence. Although only introductory biological science is a prerequisite for acceptance, students will find it useful to have completed some of the other requirements (listed below) by the end of their sophomore year, preferably in the first semester. Human Ecology students should also consult the current Human Ecology Guide and meet with the college advising coordinator, Kay Obendorf, 202 Martha Van Rensselaer Hall, 255-3151.

Major Requirements

1) Basic courses

A. Biological sciences 101-104 or 105-106 or 107-108 (prerequisite for admission to Biology and Society)

B. College calculus (one course)* Math 106, 111, 112 or any higher level calculus

Recommended but not required: General chemistry (one year sequence) (prerequisite to biochemistry and other chemistry courses): Chemistry 103-104, 207-208, or 215-216

2) Foundation Courses (should be completed by end of junior year)

A. Ethics: One course; B&SOC 205 (also S&TS 205) or B&SOC 206 (also S&TS 206)

B. Social sciences/humanities foundation: Two courses; one from any two of the following subject areas: History of Science; Philosophy of Science; Sociology of Science; Politics of Science; and Science Communication**

C. Biology foundation (Breadth requirement): Three courses; one from each of the following areas: Ecology (BIO ES 261); Evolutionary Biology (BIO ES 278); Biochemistry, Molecular and Cell Biology (BIO BM 231 or 330 or 331 or 333); Microbiology, Development (BIO GD 281 or 282 or Plant Breeding 225); Neurobiology and Behavior (BIO BI 212 or 222); Botany (BIO PL 241); and Anatomy and Physiology (BIO AP 311 or NS 341 but NOT BIO AP 212)

D. Biology foundation (Depth requirement): One biology course for which one of the above (2.C.) is a prerequisite

E. Statistics: One course selected from BTRY 200, ILR 210, BTRY 215, AG EC 353, EDUC 353, Soc 301, Psych 350, Math 372, Econ 319, ORIE 370, BTRY 601, CRP 121

3) Core Course: (one course). Should be completed by end of junior year.

B&SOC 301 Biology and Society: The Social Construction of Life (also S&TS 401); or Phil 286: Science and Human Nature (also S&TS 286)

4) Theme (five courses that correspond to the theme selected by the student). These courses must be above the 100-level, at least 3 credit hours and taken for a letter grade.

A. Natural Science Issues/Biology Elective (two courses). Select from the list of B&SOC approved Natural Science Issues courses or choose course(s) with significant biological content from: ALS, AN SC, ASC, BIO, B&SOC, BTRY, CRP, ECON, FOOD, HDFS, NS, NTRES, PL BR, PL PA, PSYCH, VTMED

B. Humanities/social sciences electives (Two courses. Courses from the list of Senior Seminars may be used as theme electives if not used to meet another requirement).

C. Senior Seminar (One course taken senior year). Courses change yearly.

* Students may petition to take a second statistics course (an advanced course, in sequence with the statistics course taken in the foundation) in place of the calculus requirement.

** Among the courses taken to meet the social sciences and humanities requirements (2.A, 2.B, 3, and 4.C), a minimum of two social science courses and two humanities courses must be chosen. History of biology/history of science and philosophy of science courses may be counted toward the humanities requirement for the major.

Themes in the Major
Biology and society students must elect a particular specialization within the major and select their courses accordingly. There are currently six recommended themes in the biology and society major: biology, behavior, and society; biology and human population; biology and public policy; environment and society; food, agriculture, and society; and health and society. Students may also develop their own themes (which in recent years have included topics such as biotechnology and society, and agriculture, environment, and society) in consultation with their faculty adviser. Students are expected to select courses taken to meet the foundation, core, and theme requirements so as to build a coherent theme. Sample curricula for the recommended themes and for several student-developed themes are available in the Biology and Society office.

Independent Study
Projects under the direction of a biology and society faculty member are encouraged as part of the program of study in the students theme area. Applications for research projects are accepted by individual faculty members. Students may enroll for 1-4 credits in Biology and Society 375 (Independent Study) with
An honors project, students must register for the total credits desired for the whole project each term (e.g. 8 credits for the fall term and 8 credits for the spring term). Students should note, however, that Biology and Society 499, because it is a special honors course, is to be taken in addition to those courses that meet the regular major requirements. Honors projects cannot be used to fulfill the senior seminar requirement.

Honors Thesis: Students and their advisers should meet regularly during the period of research and writing for the honors thesis. The responsibility for scheduling these meetings, and for carrying out the research agreed on, rests with the student. Advisers are expected to make themselves available for discussions as desired, and to offer advice on the plan of research, as well as provide critical and constructive comments on the written work as it is completed. They are not expected, however, to have to pursue students either to arrange meetings or to ensure that the research and writing are being done on schedule.

There is no prescribed length for a thesis, as different topics may require longer or shorter treatment, but normally it should be no longer than seventy double-spaced, typed pages. The thesis must be completed in a form satisfactory for purposes of evaluation and submitted to the two thesis advisers and one member of the Biology and Society faculty appointed by the Biology and Society chair by April 15. The candidate must meet with the three reviewers to formally defend the thesis by April 29.

Evaluation and Recommendation: Two copies of the completed and defended thesis (suitably bound in a plastic or hard-backed cover), together with the advisers' recommendations, must be submitted to the Honors Program Committee by May 10.

Following the formal defense of the thesis, the thesis advisers will each submit to the Honors Program Committee a recommendation that includes (1) an evaluation of the honors work and the thesis, (2) an evaluation of the student's academic record in the biology and society major, and (3) a recommendation for or against awarding honors. (For College of Arts and Sciences students, a recommendation for the level of honors must be included.) Copies of the thesis and recommendations will be circulated to the Honors Program Committee. As the committee may have little knowledge of the subject area of the thesis, letters of recommendation should be carefully prepared to help the committee ensure consistency in the honors program. Unless there is serious disagreement, the Honors Program Committee will make the decision after consultation with the interested parties.

Selection of Students: During the first three weeks of the fall semester, senior Biology and Society majors are considered for entry into the honors program by the Honors Program Committee. Applications for the honors program are available at the Biology and Society office, 275 Clark Hall. To qualify for the honors program, students must explain how the honors work will fit into their overall program, must have an overall Cornell cumulative grade-point average of at least 3.60, and must have at least a 3.30 cumulative grade-point average in all courses used to meet the major requirements. Students in the College of Agriculture and Life Sciences must also meet the requirements of that college and be selected by one of the existing college honors committees.

If, after admission to the honors program, a student fails to maintain a high scholastic average, or if for any other reason(s) he or she is considered unsuited for honors work, the student reverts to candidacy for, or in advance of, an honors project. The student who does not continue in the honors program receives credit for any work passed in the program but is not eligible for a degree with honors.

Project Requirements: The satisfactory completion of a special project and the writing and oral defense of an honors thesis are required. The project must include substantial research, and the completed work should be of wider scope and higher quality than the work normally required for an advanced course.

Initiative for formulation of ideas, developing the proposal, carrying out the study, and preparation of a suitable thesis lies with the student. Honors projects will be under the direction of two advisers. Candidates must first find a Biology and Society faculty member willing to serve as the adviser and, together with the adviser, find a second adviser among the faculty at large. The purpose of the second adviser is to guarantee expertise in the subject matter covered by the thesis. Students in the College of Agriculture and Life Sciences must select this adviser from the area in which their thesis will be reviewed.

For description, see S&TS 114.

I. Freshman Writing Seminars

B&SOC 104 Ecosystems and Ego Systems
Spring. 3 credits.

B&SOC 114 Ecology and Social Change
For description, see S&TS 114.

II. Foundation Courses

A. Ethics (select one)

B&SOC 205 Ethical Issues in Health and Medicine (also Science and Technology Studies 205)
Spring. 4 credits. Limited to 100 students. Open to sophomores, juniors, and seniors.

In today's rapidly changing world of health and medicine, complex ethical issues arise in many contexts—from the private, interpersonal interactions between doctor and patient to the broad, mass-mediated controversies that make medicine into headline news. This course examines ethical problems and policy issues that arise in contemporary medicine, health care, and biomedical research. Tools for ethical analysis are applied to a variety of cases and fundamental questions in bioethics. Perspectives from social science, history, and law also inform the course. We will explore ethical questions that arise in a number of substantive contexts, including the doctor-patient relationship, medical decision making near the end of life, human experimentation, genetics and reproductive technology, public health, and the allocation of scarce resources.

B&SOC 206 Ethics and the Environment (also Science and Technology Studies 206)
Fall. 4 credits. Limited to 50 students.
Open to all undergraduates; permission of instructor required for freshmen.

S. Hilgartner.

We address how ethical analysis helps shape our responses to environmental problems. Case studies will help guide our assessments. You will be challenged to develop ethical solutions or approaches on your own and in small groups. Major aims include: articulating the relationships between knowledge and values, exploring the ethical implications of different conceptions of "nature"; and distinguishing between ethics and economics, ecology, ideology, politics, and prudence or wisdom. A background in basic ecology or environmental issues OR ethics is helpful.

R. Social Sciences/Humanities Foundation (2 courses, 1 from any 2 areas)

I. History of Science

B&SOC 322 Medicine and Civilization (also German Studies 322) 
Fall. 3 credits. Not offered 1995-96.
For description, see GERST 322.

HIST 282 Science in Western Civilization (also Science and Technology Studies 282) 
Spring. 4 credits. P. Dear.

HIST 465 Scientific Rhetoric in Historical Perspective (also S&TS 465 and co-meets with COMM 465) 
Spring. 4 credits. Not offered 1995-96.

BIOL 207 Evolution (also Science and Technology Studies 287 and History 287) 
Fall. 3 credits. (May not be taken for credit after BIOS 378, Evolutionary Biology.) W. Provine.
from science, medicine, law, and public policy. A research paper is required.

[B&SOC 407 Law, Science, and Public Values (also Government 407 and Science and Technology Studies 407) ]
Fall. 4 credits. Not offered 1995-96.
S. Jasanoff.
This course explores the varied interactions between science and the legal process that have developed in recent years as a result of attempts to bring greater public accountability to the use of science and technology. It examines the activities of both legislatures and courts in controlling science and analyzes the values underlying these initiatives. Three major types of science-law interactions form the focus of the course: expert testimony in the courtroom, regulation of hazardous technologies, and legal control of professional standards in science and medicine. Specific topics include the regulation of toxic chemicals and nuclear power, controversies about biotechnology, reproductive technologies and biomedical research, and scientific misconduct.

S&TS 391 Science in the American Polity: 1960-Now (also GOVT 309)
Spring. 4 credits. M. Dennis.

[S&TS 425 Global and Domestic Dimensions of Science and Technology Policy (also Government 468) ]
Fall. 4 credits. Not offered 1995-96.

[S&TS 427 Politics of Environmental Protection in America (also GOVT 427) ]
Fall. 4 credits. Not offered 1995-96.

[S&TS 431 Introduction to Science and Technology Policy (also Government 401) ]
Fall. 4 credits. Not offered 1995-96.

5. Science Communication

B&SOC 300 Investigative Research on the Social Impact of Science (also Textiles and Apparel 301 and Science and Technology Studies 402)
Spring. 4 credits. Prerequisite: one year of science and permission of the instructor. Offered alternate years. Limited to 12.
S. Jasanoff.
Students choose a current issue in the social impact of biological or physical sciences and work through the steps of investigation from issue definition to spoken presentations and proposals for action. In a workshop setting, students comment upon and learn from other's projects and discuss case studies and articles, with occasional guest speakers and films.

COMM 352 Science Writing for the Mass Media (also Science and Technology Studies 352)
Fall. 3 credits. Not open to freshmen. Limited to 25 students. Prerequisite: one college-level course. B. Lewenstein.

COMM 360 Scientific Writing for Public Information
Fall or spring. 3 credits. Limited to 25 nonfreshman or graduate students per section. Prerequisite: any college-level writing course.

[COMM 486 Public Communication of Science and Technology (also S&TS 486) ]
Spring. 3 credits. Not offered 1995-96.
B. Lewenstein.

[HIST 465 Scientific Rhetoric in Historical Perspective (also S&TS 465 and co-meeting with COMM 465) ]
Spring. 4 credits. Not offered 1995-96.
P. Dear and B. Lewenstein.

C. Biology foundation (Breadth Requirement): Three courses: one from three of the following subject areas.

1. Biochemistry, Molecular and Cell Biology

BIOBM 231 General Biochemistry
Fall. 5 credits.

BIOBM 330 Principles of Biochemistry, Individual Instruction
Fall or spring. 4 credits.

BIOBM 331 Principles of Biochemistry, Lectures
Fall. 4 credits. (2 credits if taken after Biological Sciences 231)

NS 262 The Cell and the External World
Spring. 3 credits.

2. Ecology

BIOES 261 Ecology and the Environment
Fall. 4 credits.

3. Genetics and Development

BIOGD 281 Genetics
Fall, spring, or summer. 5 credits.

BIOGD 282 Human Genetics
Spring. 3 credits. (2 credits if taken after Biological Sciences 281)

PL BR 225 Plant Genetics
Spring. 4 credits. Offered alternate years.

4. Evolutionary Biology

BIOES 278 Evolutionary Biology
Spring. 4 credits.

5. Microbiology

BIOMI 200 General Microbiology Lectures
Fall, spring, or summer. 3 credits.
Prerequisites: BIOMI 101-102 and 103-104 and CHEM 104 or 208 or equivalent. Recommended: concurrent registration in BIOMI 291.

6. Neurobiology and Behavior

BIORB 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3 or 4 credits (4 credits with discussion and written projects). Not open to freshmen.

BIORB 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits. (4 credits with discussion and written projects). Not open to freshmen. Limited to 20 students.

7. Botany

BIOPL 241 Introductory Botany
Fall. 3 credits. Prerequisite: one year of introductory biology or permission of instructor.
8. **Physiology and Anatomy**

**BIOAP 311 Introductory Animal Physiology, Lectures (also Veterinary Medicine 346)**
Fall. 3 credits. Prerequisite: one year of college biology, chemistry, and mathematics. Recommended: previous or concurrent course in physics.

**NS 341 Human Anatomy and Physiology**
Spring. 4 credits.

D. **Biology foundation** (depth requirement): One course for which one of the above breadth requirement courses (2C) is a prerequisite.

E. **Statistics (select one)**

**ARME 310 Introductory Statistics**
Fall and spring. 4 credits.

**CRP 320 Introduction to Statistical Reasoning for Urban and Regional Analysis**
Fall. 3 credits.

**ECON 319 Introduction to Statistics and Probability**
Fall or summer. 4 credits. Prerequisites: Economics 101-102 and Mathematics 111-112.

**EDUC 353 Introduction to Educational Statistics**
Spring. 3 credits. Prerequisite: Education 352 (1 credit) or concurrent registration.

**ILR 210 Statistics: Statistical Reasoning**
Fall and spring. 4 credits.

**MATH 372 Elementary Statistics**
Fall. 4 credits. Not offered 1995-96.

**OR&IE 370**
Fall. 4 credits. Not offered 1995-96.

**PSYCH 350 Statistics and Research Design**
Fall. 4 credits.

**SOC 301 Evaluating Statistical Evidence**
Fall. 4 credits.

**BTRY 200 Statistics and the World We Live In**
Fall. 3 credits.

**BTRY 215 Introduction to Statistical Methods**
Fall. 3 credits.

**BTRY 601 Statistical Methods I**
Fall. 4 credits.

III. **Core Courses**

**B&SOC 301 Biology and Society: The Social Construction of Life (also Biological Sciences 301 and Science and Technology Studies 401)**
Fall. 4 credits. Prerequisite: one year of introductory biology or permission of instructor. Limited to 75 students.

P. J. Taylor.

Critical thinking about the diverse influences shaping the life sciences. Topics include evolution and natural selection, heredity and genetic determinism, biotechnology and reproductive interventions, ecology and environmental change. We interpret episodes, past and present, in biology in light of scientists' historical location, economic and political interests, use of language, and ideas about causality and responsibility. Readings, class activities, and written assignments are designed so that students develop interpretive skills and explore their own intellectual and practical responses to controversies in biology and society.

**[PHIL 286 Science and Human Nature (also Science and Technology Studies 286)]**
Spring. 4 credits. Not offered 1995-96. For description, see PHIL 286.

IV. **Themes**

A. **Natural Science Issues/Biology Elective** (two courses). Select from the list of B&SOC approved Natural Science Issues courses or choose course(s) with significant biological content from: AN, AN SC, BIOSCI, ENTOM, FOOD, HDFS, NS, NTRES, PL BR, PL PA, PSYCH, VTMED.

**[B&SOC 201 Biotechnology: The 'New' Biology (also Biological Sciences General, BIO 201)]**
Spring. 3 credits. Prerequisite: one year of introductory biology or equivalent. This course is for students not majoring in biological sciences. Not for students who have taken or are currently enrolled in BIODG 281, BIOBMB 330, or 331. Letter grades only. Not offered 1995-96. Designed for nonmajors, a general introduction to the application and issues of modern molecular biology in medicine and agriculture. Information on recombinant DNA technology, monoclonal antibodies, plant cell culture techniques, and embryo manipulation methods is presented. Topics include medical diagnostics and treatments; environment, agriculture, and food; and economic, social-policy, regulatory, ethical, and legal issues that surround biotechnology. The course is taught in three modules and the topics vary from year to year. Topics for 1995 are human gene mapping and genetic screening; crop plant biotechnology, and immunodiagnostics and therapy (AIDS and cancer.) Recommended for those students who want to understand some new research discoveries, their applications, and social, legal, ethical, and policy issues stemming from them.

**[B&SOC 214 Biological Basis of Sex Differences (also Women's Studies 214)]**
Not offered 1995-96. For description, see BIOAP 214

**B&SOC 232 Recombinant DNA Technology and its Applications**
For description, see BIOBMB 232.

**B&SOC 347 Human Growth and Development: Biological and Social Psychological Considerations (also Human Development and Family Studies 347 and Nutritional Sciences 347)**
Spring. 3 credits. Prerequisites: Biological Sciences 101 or 109 or equivalent, and Human Development and Family Studies 115 or Psychology 101. Offered alternate years.

A review of major patterns of physical growth from the fetal period through adolescence, with consideration of biological and socio-environmental determinants of growth as well as physical and psychological consequences of variations in growth patterns. An examination of normal patterns of growth is followed by an analysis of major sources of variations in growth (normal and atypical).

**ASTRO 202 Our Home in the Solar System**
Spring. 3 credits.

**BIOPL 246 Plants and Civilization**
Spring. 3 credits.

**BIOES 275 Human Biology and Evolution (also Anthropology 275 and Nutritional Sciences 275)**
Fall. 3 credits. Offered alternate years.

**NTRES 201 Environmental Conservation**
Spring. 3 credits.

**NS 222 Maternal and Child Nutrition**
Spring. 3 credits.

**NS 361 Biology of Normal and Abnormal Behavior (also Psychology 361)**
Fall. 3 credits.

**NS 650 Public Health Nutrition**
Spring. 3 credits.

**HDFS 370 Abnormal Development and Psychopathology**
Spring. 3 credits.

**HDFS 466 Neurobiological of Personality and Psychopathology**
Fall. 3 credits.

**NS 331 Physiological and Biochemical Bases of Human Nutrition**
Spring. 3 credits.

8. **Humanities/Social Science elective** (two courses)

Courses listed earlier as social science/humanities foundation courses (2.B.) are particularly appropriate as social science/humanities electives. However, a single course cannot be used to meet both requirements. Additional courses that are recommended as social science or humanities electives are:

**Examples of social science electives**

**HISTORY 286 The Historical Development of Women as Professionals, 1800 to 1950**
Fall or spring. 3 credits.

**HISTORY 390 The Historical Development of Women as Professionals, 1800 to the Present (also Women's Studies 238 and History 238)**
Fall. 3 credits. Limited to 120 students. Not offered 1995-96.

**HSS 315 Human Sexuality**
Spring. 4 credits.
C. Senior Seminars

**B&SOC 447 The History of Biology (also History 415 and Science and Technology Studies 447 and BIO G 467)**
Fall. 4 credits. Limited to 18 students. A Common Learning course.

**B&SOC 404 Human Fertility in Developing Nations (also Rural Sociology 408)**
Spring. 3 credits. Prerequisite: population course or permission of instructor. Offered alternate years. Not offered 1995-96.
A review of the major literature dealing with the social causation of variation in human fertility. Emphasis will be on international comparisons and on the methodology of field research.

**B&SOC 406 Biotechnology and Law (also Science and Technology Studies 406)**
Fall. 4 credits. Limited to 16 students. Recommended: a course in genetics or DNA, a course in American government or law, or permission of instructor. Fee for course reading materials. Not offered 1995-96.
S. Jasanoff

**B&SOC 414 Population Policies (also Rural Sociology 418)**
Spring. 3 credits. Prerequisite: a population course or permission of instructor. Offered alternate years. The ways in which societies try to affect demographic trends. Special focus is on government policies and programs to influence fertility.

**B&SOC 451 AIDS and Society**
Fall. 3 credits. Limited to students who have been approved by course coordinators. A Common Learning course. Not offered 1995-96.
Discussions of the effect of HIV infection and AIDS on society will consist of seminars on the biology of the virus, medical treatment, transmission and prevention, and personal, social, and political impact of HIV/AIDS. Students will have the opportunity to initiate and carry out AIDS education projects on campus.

**B&SOC 460 Social Analysis of Ecological Change (also Rural Sociology 660 and Science and Technology Studies 660)**
Fall. 4 credits. Prerequisite: one year of science. Limited to 20 graduate students and seniors with permission of instructor. Offered alternate years. P. J. Taylor. Scientific studies of ecological and social processes, together with interpretation of those studies by historians, sociologists, and anthropologists. Topics include ideas of nature, colonial conservation science, systems ecology, the tragedy of the commons, neo-Malthusianism, human ecology, local knowledge, nomadic pastoralism, political ecology, women and eco-development, and global environmental discourse.

**B&SOC 461 Environmental Policy (also Agriculture and Life Sciences 461)**
Fall. 4 credits.

**HDFS 610 Processes in Human Development**
Spring. 3 credits. Limited to 20 students. Open to graduate students and juniors and seniors in HDFS and related fields with recommendation from faculty member and instructor's permission. Prerequisite: a minimum of one course in statistics. Not offered 1995-96.

**HDS 613 Seminar on Mental Health and Related Services**
Fall. 3 credits.

**HDS 625 Health Care Services: Ethical and Legal Perspectives**
Fall. 3-4 credits. If using this course as a senior seminar, B&Soc majors must take it for 4 credits by writing a major paper. Permission of instructor required for registration. Enrollment limited to 10 undergraduates—preferential giving to HSS students.

**HDS 631 Managed Health Delivery Systems: Primary-Ambulatory Care**
Spring. 3 credits.

**PHIL 661 Theory of Knowledge (also Science and Technology 661)**
Spring. 4 credits.

**S&TS 412 Politics of the Human Body**
Spring. 4 credits. Not offered 1995-96.

**S&TS 427 The Politics of Environmental Protection in America (also Government 427)**
Fall. 4 credits. Not offered 1995-96.

**S&TS 626 Workshop on Law, Science and Technology (also Government 626)**
Spring. 4 credits. Not offered 1995-96.

**S&TS 645 Genetic Engineering: Politics and Society in Comparative Perspective (also Government 634)**
Spring. 4 credits.

**S&TS 669 International Environmental Policy (also Government 687)**
Spring. 4 credits. Not offered 1995-96.

V. Other Courses

**B&SOC 375 Independent Study**
Fall or spring. 1-4 credits. Prerequisite: must have written permission of faculty supervisor and Biology and Society major. Projects under the direction of a Biology and Society faculty member are encouraged as part of the program of study within the student's concentration area. Applications for research projects are accepted by individual faculty members. Students may enroll for 1-4 credits in Biology and Society 375 (Independent Study) with written permission of the faculty supervisor and may elect either the letter grade or the S-U option. Students may elect to do an independent study project as an alternative to, or in advance of, an honors project. Applications and information on faculty research, scholarly activities, and undergraduate opportunities are available in the Biology and Society office, 275 Clark Hall. Independent study credits may not be used in completion of the major requirements.

**B&SOC 400 Undergraduate Seminar**
Fall or spring. Variable credit. May be repeated for credit.
From time to time different seminars on topics of interest to undergraduates are offered. Topics and instructors are listed in the biology major requirements.
and society supplement issued at the beginning of each semester.

**B&SOC 499 Honors Project**

Fall or spring, two-semester projects are acceptable. 3-5 credits each term with a maximum of 8 credits for the entire project. Open only to biology and society students in their senior year. Students enrolled in Biology and Society 499 will receive a letter grade at the end of their final term, whether or not they complete a thesis and whether or not they are recommended for honors. Students enrolled for the whole term and receive either a letter grade for both terms or a grade of "R" for the first term with a letter grade for both terms submitted at the end of the second term. When a student is enrolled for two terms, the student and the thesis adviser must reach a clear agreement at the outset as to which grade will be assigned for the first term and on the basis of what sort of work. Minimally an honors thesis outline and bibliography should be completed by the first term. Applications and information are available in the Biology and Society office, 275 Clark Hall.

**Cognitive Studies Program**


Cognitive studies is comprised of a number of disciplines that are grouped by a major concern with fundamental capacities of the mind, such as perception, memory, reasoning, language, and the organization of motor action. In the College of Arts and Sciences these disciplines are represented in the departments of Computer Science, Linguistics, Mathematics, Philosophy, and Psychology. Elsewhere in the university they are represented in the Department of Human Development and Family Studies (College of Human Ecology), the Section of Neurobiology and Behavior (Division of Biological Sciences), and the Department of Education (College of Agriculture and Life Sciences).

The issues addressed in cognitive studies arise at several levels. At the broadest level are problems of characterizing and understanding such basic notions as "mind," "knowledge," "information," and "meaning." At a more specific level are questions regarding the abstract operating principles of individual components of the mind, such as perception, and the underlying visual perception, language ability, and understanding of concepts. These principles concern the organization and behavior of the components and also how they develop and change. At the most specific level are questions about the properties of the elementary computational structures and processes that constitute these components.

Important insights into issues of these kinds have been achieved in recent years as a result of the various cognitive studies disciplines converging in their theoretical and methodological approaches. It is this convergence, in fact, that warrants grouping the disciplines together under the single term "cognitive studies." Even greater progress can be expected in the future as a consequence of increasing cooperation among the disciplines.

**Undergraduate Concentration**

The committee for undergraduate concentration in cognitive studies consists of Claire Cardie, computer science, 5-9206, 4124 Upson Hall, cardie@cs.cornell.edu; James Gair, linguistics, 5-5110, 407 Morrill Hall, jwg2@cornell.edu; Carl Ginet, philosophy, 5-6818, 224 Goldwin Smith, cag2@cornell.edu; David Field, psychology, 5-6393, 250 Uris Hall, df2@cornell.edu. Initial inquiries concerning the undergraduate concentration should be made with the Cognitive Studies coordinator, Sue Wurster, 255-6431, who will provide application materials and set up a meeting with a relevant member of the committee. If, after meeting with the committee member, a concentration seems appropriate, the applicant will be assigned an adviser selected from all faculty members who are in the field of Cognitive Studies.

The undergraduate concentration in cognitive studies provides a framework for the design of structured, individualized programs of study in this growing interdisciplinary field. Such programs of study are intended to serve as complements to intensive course work in a single discipline as represented by an individual department, it is considered crucial that students gain a strong background in an individual department, independent of their work in the concentration. This background provides both a foundation and a focus for the concentration work.

In light of the importance of a strong background in an individual department, it is required that a student seeking admission to the concentration have completed or plan to complete any three courses in one department from among the list of courses below. Such a student will typically be a major in the department, but being a major is not necessary. The Section of Neurobiology and Behavior counts as a department here.) To enter the concentration, the student should apply at the Cognitive Studies office, 273A Uris Hall. The student will then be referred to a member of the concentration committee, who will assign the student a concentration advisor and who will be interested in the student's main areas of interest and is outside of the student's major department.

The concentration requires that the student take several courses (usually a minimum of three) from departments other than the one from which the student takes the three courses needed for admission to the concentration. The student must gain approval for this selection of courses from the concentration advisor. The courses will generally be chosen from among the list below, but other courses are permissible in individual cases.

The courses selected should form a coherent cluster that makes sense to both the adviser and the student; an unstructured selection of three courses from the approved set might well be inadequate.

In addition, the concentration encourages each student to be involved in at least one independent research study that bears on research issues in cognitive studies, if possible. It is recommended that students report on their research activities in an annual undergraduate forum sponsored by the program. The Undergraduate Committee is committed to helping students find an appropriate research placement when needed.

Students who successfully complete these requirements will have their concentration in Cognitive Studies officially represented on their diploma. Students in good standing in the concentration will be eligible to compete for a limited number of summer research fellowships and travel awards to relevant conferences in the cognitive sciences. In addition, students who have completed all requirements for the concentration will be eligible for enrollment in the graduate proseminar in Cognitive Studies (Cognitive Studies 773-774).

In addition to assisting in and approving the student's selection of courses, the concentration advisor serves as a general source of information about the field of cognitive studies, relevant resources around the university, and job and graduate school opportunities. For further information, consult the Cognitive Studies office, 273A Uris Hall or the undergraduate concentration committee listed above.

**Graduate Minor**

For information, consult the program office (273A Uris Hall, 255-6431, cogst@cornell.edu or the graduate field representative, Barb Lust 255-0829, bd4@cornell.edu).

**Courses**

**Cognitive Studies**

COGST 470 Undergraduate Research in Cognitive Studies

Fall or spring. 1-4 credits. S-U grades optional. Prerequisite: permission of Cognitive Studies faculty member who will supervise the research and assign the grade. Hours to be arranged. Cognitive Studies faculty.

Experience in planning, conducting, and reporting independent laboratory, field, and/or library research in an interdisciplinary area relevant to cognitive studies.

**Computer Science**

COM S 211 Computers and Programming

Fall or spring. 3 credits.

COM S 212 Structure and Interpretation of Computer Programs

Fall or spring. 4 credits.

COM S 260 Discrete Structures

Fall or spring. 4 credits.

COM S 381 (or 481) Introduction to Theory of Computing

Fall. 3 or 4 credits.
COM S 410 Data Structures
Fall or spring. 4 credits.

COM S 411 Programming Languages and Logic
Fall 1996 and 1998. 4 credits.

COM S 462 Robotics and Machine Vision
Spring 1997. 3 credits.

COM S 463 Robotics and Machine Vision Lab
Spring 1997. 2 credits.

COM S 472 Foundations of Artificial Intelligence
Fall. 3 credits.

COM S 473 Practicum in Artificial Intelligence
Fall. 2 credits.

COM S 482 Introduction to Analysis of Algorithms
Spring. 4 credits.

COM S 486 Applied Logic (also Mathematics 486)
Fall or spring. 4 credits.

Education (College of Agriculture and Life Sciences)
EDUC 210 Psychology of Learning and Memory
Fall. 3 credits. Not offered 1996.

EDUC 312 Learning to Learn
Spring. 3 credits.

Human Development and Family Studies (College of Human Ecology)
HDFS 331 Learning in Children
Fall. 3 credits.

HDFS 333 Cognitive Processes in Development
Spring. 3 credits.

HDFS 334 The Growth of the Mind
Spring. 4 credits. Not offered 1995-96.

HDFS 432 Cognitive Development and Education
Spring. 3 credits. Not offered 1995-96.

HDFS 436 Language Development (also Psychology 436 and Linguistics 436)
Spring. 4 credits.

HDFS 438 Thinking and Reasoning
Spring. 3 credits.

HDFS 439 Cognitive Development: Infancy through Adolescence
Fall. 3 credits.

HDFS 472 Typical and Atypical Intellectual Development
Spring. 3 credits.

Modern Languages and Linguistics
LING 101 Theory and Practice of Linguistics
Fall, spring or summer. 4 credits.

LING 201 Introduction to Phonetics and Phonology
Spring. 4 credits.

LING 203 Introduction to Syntax and Semantics
Fall. 4 credits.

LING 264 Language, Mind, and Brain
Fall. 4 credits. Not offered 1995-96.

LING 301-302 Phonology I, II
Fall and spring. 4 credits each term.

LING 303-304 Syntax I, II
Fall and spring. 4 credits each term.

LING 309-310 Morphology I, II
Fall and spring. 4 credits each term.

LING 319-320 Phonetics I, II
Fall. 4 credits each term. Not offered 1995-96.

LING 325 Pragmatics
Fall. 4 credits.

LING 334 Non-Linear Syntax
Fall. 4 credits. Not offered 1995-96.

LING 350 Representing Language: Knowledge Taught and Untaught
(also COGST 350)
Spring. 4 credits. Not offered 1995-96.

LING 370 Language and Cognition (also Psychology 370)
Spring. 4 credits. Not offered 1995-96.

LING 400 Semiotics and Language (also Comparative Literature 410)
Spring. 4 credits.

LING 401 Language Typology
Fall. 4 credits.

LING 421-422 Semantics I, II
Fall and spring. 4 credits each term.

LING 436 Language Development (also Psychology 436 and HDFS 436)
Spring. 4 credits.

LING 450 Mathematical Methods for Linguistics
Fall. 4 credits. Not offered 1995-96.

Mathematics
MATH 481 Mathematical Logic (also Philosophy 431)
Spring. 4 credits.

MATH 483 Intensional Logics and Alternatives to Classical Logics
(also Philosophy 436)
Spring. 4 credits. Not offered 1995-96.

MATH 486 Applied Logic (also Computer Science 486)
Spring. 4 credits.

MATH 487 Applied Logic II
Spring. 4 credits. Not offered 1995-96.

Neurobiology and Behavior (Division of Biological Sciences)
BIONB 221 Neurobiology and Behavior I: Introduction to Behavior
Fall. 3 or 4 credits.

BIONB 222 Neurobiology and Behavior II: Introduction to Neurobiology
Spring. 3 or 4 credits.

BIONB 326 The Visual System
Spring. 4 credits.

BIONB 328 Biopsychology of Learning and Memory (also Psychology 332)
Spring. 3 credits.

BIONB 396 Introduction to Sensory Systems (also Psychology 396)
Spring. 3 or 4 credits.

BIONB 424 Neuroethology
Spring. 3 credits.

BIONB 482 Sensory Function (also Psychology 492)
Spring. 3 or 4 credits. Not offered 1995-96.

BIONB 496 Bioacoustic Signals in Animals and Man
Spring. 3 credits. Not offered 1995-96.

Philosophy
PHIL 231 Introduction to Formal Logic
Fall and spring. 4 credits.

PHIL 261 Knowledge and Reality
Spring. 4 credits. Not offered 1995-96.

PHIL 262 Philosophy of Mind

PHIL 286 Science and Human Nature (also Science and Technology Studies 286)

PHIL 318 Twentieth-Century Philosophy
Spring. 4 credits.

PHIL 331 Formal Logic
Spring. 4 credits.

PHIL 332 Philosophy of Language
Fall. 4 credits.

PHIL 361 Metaphysics and Epistemology
Fall. 4 credits.

PHIL 381 Philosophy of Science: Knowledge and Objectivity (also Science and Technology Studies 381)
Fall. 4 credits.

PHIL 382 Philosophy and Psychology

PHIL 389 Philosophy of Science: Evidence and Explanation

PHIL 431 Deductive Logic (also Mathematics 481)

PHIL 433 Philosophy of Logic

PHIL 436 Intensional Logic (also Mathematics 483)

PHIL 437 Problems in the Philosophy of Language
Spring. 4 credits. Not offered 1995-96.

PHIL 461 Metaphysics
Spring. 4 credits. Not offered 1995-96.

Psychology
PSYCH 205 Perception
Spring. 3 credits.

PSYCH 209 Development
Spring. 4 credits.

PSYCH 214 Issues in Cognitive Psychology
Fall. 3 credits.

PSYCH 215 Psycholinguistics
Fall. 3 or 4 credits. Not offered 1995-96.

PSYCH 305 Visual Perception
Fall. 4 credits.

PSYCH 309 Development of Perception and Representation
Fall. 3 credits. Not offered 1995-96.
The proseminar will include suggestions from faculty in each field for further advanced interdisciplinary research that can be pursued at Cornell during a Cognitive Studies minor. It will conclude (end of second term) with individual student presentations in which students initiate a critique of some interdisciplinary research, after consultation with a faculty member of their choice.

Although suitable to entering graduate students, the proseminar is also open to graduate students beyond their first year. Advanced undergraduates with a Cognitive Studies concentration may also be admitted. This is a year-long lecture and discussion course. The year-long commitment is mandatory. An "R" grade will be assigned in the fall semester, and an "S" grade will only be assigned in the spring semester.

**College Scholar Program**

Dean Lynne Abel, director, 55 Goldwin Smith Hall, 255-3386.

The College Scholar program is described in the introductory section of Arts and Sciences.

**COLLS 397 Independent Study**

Fall or spring. 1-4 credits. Prerequisite: permission of program office.

**COLLS 499 Honors Research**

Fall or spring. 1-6 credits; a maximum of 8 credits may be earned for honors research. Prerequisite: permission of program director. Each participant must submit a brief proposal approved by the honors committee.

**East Asia Program**

140 Uris Hall


East Asian studies at Cornell is led by thirty-four faculty members from five colleges, who participate in a program of research and teaching on the civilizations and cultures of East Asia. Courses are offered through various departments in most of the humanities and social science disciplines, as well as in the fields of business, city and regional planning, international and comparative labor relations and rural sociology. Language courses in Mandarin, Cantonese, Korean, and Japanese are offered, in addition to the Full-year Asian Language Concentration (FALCON) in Japanese and Mandarin. Undergraduates major in the Department of Asian Studies and concentrate on the literature and culture of one or more East Asian countries, while graduate students may work toward an M.A. in East Asian studies, a dual M.B.A./M.A. degree, or an M.A./Ph.D. degree in a discipline such as agricultural economics, anthropology, art, and regional planning, government, history, history of art, linguistics, literature, rural sociology, or sociology. A variety of fellowships, travel grants, awards, and assistanships are available for graduate students concentrating on East Asia.

**Freshman Writing Seminars**

For information about the requirements for freshman writing seminars and descriptions of seminar offerings, see the John S. Knight Writing Program section, and consult the John S. Knight Writing Program brochure, available from college registrars in August for the fall term and in late October for the spring term.

**Human Biology Program**

J. Haas (nutritional sciences), director, 211 Savage Hall, 255-8001, B. Finlay (psychology), J. Fortune (physiology/women's studies), E. Frongillo (nutritional sciences), R. Johnston (psychology), K.A.R. Kennedy (ecology and systematics/anthropology), D. Levitsky (neurobiology), D. McLean (ecology and systematics), P. W. Nathanielisz (physiology), D. L. Pelletier (nutritional sciences), W. Provine (ecology and systematics/history), R. Roberts (psychology), S. Robertson (human development and family studies), R. Savin-Williams (human development and family studies), M. Small (anthropology).

Human biology integrates the methods and theories of many disciplines, such as biological anthropology, nutrition, neurobiology, physiology, psychology, demography, ecology, genetics, and paleontology, into a comprehensive study of biological diversity in Homo sapiens. A central focus of this interdisciplinary approach to the study of the human organism is an understanding of evolutionary processes that explain our biological variation through space and time. The program of study seeks to educate future biological scientists to address the concerns of a society that is becoming more demanding of the scientific community to place its specialized biological knowledge in a broader context. The human biology curriculum is of particular relevance to undergraduate students in premedical and preprofessional programs, biological anthropology, nutrition, human development, ecology and systematics, psychology, physiology, genetics, and the health-related sciences. It serves to bring a comprehensive understanding of biological diversity to students in these fields.
together students with a common interest in human biology, as defined from these diverse fields, and to provide a forum for student-faculty interaction on various topics relating to human evolution and biological diversity. Human biology is not a major but a curriculum of study that provides majors in various departments with a program for selecting elective courses that deal with the biology of the human species. Students in their junior year may develop a program of study in human biology while majoring in a number of different departmental fields.

Basic Requirements

The requirements for a program of study in human biology are designed to ensure sufficient background in physical sciences and mathematics to enable the student to pursue a wide range of interests in the fields of current biological sciences, anthropology, and fields related to the evolution and physical diversity of the human species. Adjustments may be made in these requirements, depending upon the student's academic background and affiliation with colleges and schools within the university.

The basic requirements are one year of introductory biology (Biological Sciences 101–103 plus 102–104 or 105–106 or Biological Sciences 107–108 offered during the eight-week Cornell Summer Session), one year of general chemistry (Chemistry 103–104 or 207–208 or 215–216); one year of college mathematics (Mathematics 111–112 or 105–106 or 111–115); one course in genetics (Biological Sciences 281 or 282); one course in biochemistry (Biological Sciences 231, 330, or 351). It is recommended that students planning graduate study in biological anthropology, psychology, and related fields in the medical and nutritional sciences take a course in statistics. Students should consult their faculty adviser in human biology for help in selecting appropriate courses.

Elective courses should be taken that will enable the student to acquire breadth in the subject matter of human biology outside of their departmental major. Therefore only 6 of the 15 human biology elective credits may also fulfill requirements for the major.

Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO AP 214</td>
<td>The Biological Basis of Sex Differences</td>
<td>Fall</td>
<td>3 credits</td>
</tr>
<tr>
<td>BIO AP 274</td>
<td>Functional and Comparative Morphology of Vertebrates</td>
<td>Spring</td>
<td>4 credits</td>
</tr>
<tr>
<td>BIO AP 311</td>
<td>Introductory Animal Physiology, Lectures (also Veterinary Medicine 346)</td>
<td>Fall</td>
<td>3 credits</td>
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<tr>
<td>BIO AP 319</td>
<td>Animal Physiology Experimentation (also Veterinary Medicine 378)</td>
<td>Fall</td>
<td>3 credits</td>
</tr>
<tr>
<td>BIO AP 458</td>
<td>Mammalian Physiology</td>
<td>Spring</td>
<td>3 credits</td>
</tr>
<tr>
<td>BIO ES 474</td>
<td>Laboratory and Field Methods in Human Biology (also Anthropology 474)</td>
<td>Spring</td>
<td>5 credits</td>
</tr>
<tr>
<td>NS 115</td>
<td>Nutrition and Health: Concepts and Controversies</td>
<td>Fall</td>
<td>3 credits</td>
</tr>
<tr>
<td>NS 222</td>
<td>Maternal and Child Nutrition</td>
<td>Spring</td>
<td>3 credits</td>
</tr>
<tr>
<td>NS 331</td>
<td>Physiological and Biochemical Bases of Human Nutrition</td>
<td>Spring</td>
<td>3 credits</td>
</tr>
<tr>
<td>NS 341</td>
<td>Human Anatomy and Physiology</td>
<td>Spring</td>
<td>4 credits</td>
</tr>
<tr>
<td>NS 361</td>
<td>Biology of Normal and Abnormal Behavior (also Psychology 361)</td>
<td>Fall</td>
<td>3 credits</td>
</tr>
<tr>
<td>NS 441</td>
<td>Nutrition and Disease</td>
<td>Fall</td>
<td>4 credits</td>
</tr>
<tr>
<td>PSYCH 322</td>
<td>Hormones and Behavior (also Biological Sciences 322)</td>
<td>Spring</td>
<td>3 or 4 credits</td>
</tr>
<tr>
<td>PSYCH 425</td>
<td>Brain and Behavior</td>
<td>Fall</td>
<td>3 or 4 credits</td>
</tr>
<tr>
<td>VET MI 331</td>
<td>Medical Parasitology</td>
<td>Fall</td>
<td>2 credits</td>
</tr>
</tbody>
</table>

Human Behavior

ANTHR 490 Primate Behavior and Ecology Spring. 4 credits.

BIO S 301 Biology and Society II: The Social Construction of Life (also Biology and Society 301) Fall. 4 credits.

BIO NB 427 Animal Social Behavior Fall. 4 credits.

HDFS 344 Infant Behavior and Development Fall. 3 credits.

HDFS 645 Seminar in Infancy: Newborn Behavioral Organization Spring. 3 credits.

HSS 315 Human Sexuality: A Biosocial Perspective Spring. 3 credits.

NS 245 Social Science Perspectives of Human Nutrition Fall. 3 credits.

NS 347 Human Growth and Development: Biological and Behavioral Interactions (also Human Development and Family Studies 347 and Biology and Society 347) Spring. 3 credits.

PSYCH 326 Evolution of Human Behavior Fall. 4 credits.

PSYCH 425 Brain and Behavior Fall. 3 or 4 credits.

R SOC 408 Human Fertility in Developing Nations (also B Soc 404) Spring. 3 credits.

R SOC 438 Social Demography Fall. 3 credits.

Human Evolution and Ecology

ANTHR 101 Introduction to Anthropology: Biological Perspectives on the Evolution of Human Kind Fall. 3 credits.

ANTHR 203 Early People: The Archaeological and Fossil Record (also Anthropology 203) Spring. 3 credits.

ANTHR 390 Primate Behavior and Ecology Spring. 4 credits.

ANTHR 391 The Evolution of the Human Life Cycle Spring. 3 credits.

ANTHR 490 Primates and Evolution Spring. 4 credits.

BIO G 207 Evolution Fall or summer. 3 credits.

BIO ES 261 Ecology and the Environment Fall. 4 credits.


BIO ES 275 Human Biology and Evolution (also Anthropology 275 and Nutritional Sciences 275) Fall. 3 credits.

BIO ES 371 Human Paleontology (also Anthropology 371) Fall. 4 credits.
industry, legal work, medicine, and others seeking competence in the language.

The intensive nature of the program leads to a command of the language in all its aspects—listening, speaking, reading, and writing—in the shortest possible time.

Integrated courses are offered both fall and spring semesters at three levels: beginning (Test of English as a Foreign Language [TOEFL] score below 370), intermediate (TOEFL score below 450), and advanced.

Students who have gained full admission to, or who already are registered in, degree-granting programs at Cornell should consult the section, Modern Languages and Linguistics, for information regarding courses in English as a second language (series ENGLF).

The Intensive English Program is administered by the Department of Modern Languages and Linguistics, Cornell University, Morrill Hall, Ithaca, New York 14853-4701, U.S.A.

Application materials and information are available directly from the program by calling 607/255-4863, or by faxing 607/255-7491. Internet e-mail is ejb@cornell.edu.

International Relations Concentration

Barbara Lantz, assistant dean for International Programs, administrative coordinator

Cornell University offers a unique setting for undergraduates with an interest in international relations. Cornell's several undergraduate colleges and many departments include course offerings that provide a strong grounding in the field as well as an opportunity to study more than sixty languages. The purpose of the Concentration in International Relations is to provide a structure for undergraduate students with interest in international law, economics, agriculture, foreign trade, international banking, government service, international organizations, cross-cultural affairs, or education. Students can major in one of the existing departments, such as history, government, anthropology, or economics, or design an independent major. Integral to the curriculum in international relations is both a focus on global issues and processes and an understanding of their impact on particular countries or geographic regions.

Course requirements for students entering Cornell in fall 1994 and after:

These requirements are designed to expose students to a broad range of perspectives in international relations while allowing them to tailor their course selections to specific interests. Courses throughout the university are grouped into four subject areas:

1) International Economics and Development
2) World Politics and Foreign Policy
3) Transnational Processes and Policies; and
4) Cultural Studies. Within these four subject areas, courses are also identified as "core" or "elective." Students must complete seven courses selected from the four groups according to one of two strategies. Option A emphasizes the politics and economics of international relations. Option B puts greater stress on culture. In choosing either option, students should ensure that they acquire familiarity with more than one geographic region or country.

Option A:
- One core course from Groups 1, 2, and 4
- One elective from Groups 1, 2, 3, and 4

Option B:
- One core course from Groups 1, 2, and 4
- One elective from either Group 1 or Group 2
- One elective from Group 3, and two additional electives from Group 3 or Group 4

Students should take note that many of the core courses have prerequisites. The list of electives here is representative but not complete. Many other courses throughout the university can qualify as electives for the IR Concentration.

Group 1: International Economics and Development

Core:
- Econ 365 International Economics (prereq. Econ 101–102)
- Econ 361 International Trade Theory (prereq. 101–102, 313)
- Econ 371 Economic Development (prereq. 101–102, 313)

Electives:
- Econ 367 Comparative Economic System: East & West
- Econ 369 The Economy of China
- Econ 370 Socialist Economies in Transition
- Econ 375 Economic Problems of India
- IILRC 333 Western Europe, US, and Japan in a Changing World Economy
- IILRC 339 The Political Economy of Mexico

Group 2: World Politics and Foreign Policy

Core:
- Govt 181 Introduction to International Relations
- Hist 314 History of American Foreign Policy, 1912–present

Electives:
- Govt 391 Chinese Foreign Policy
- Govt 393 Intro to Peace Studies
- Govt 400 US Political Economy in Global Perspective
- Govt 433 Politics of Economic Liberation in the Developing World
- Hist 218 The Russian Military Effort and Foreign Policy
- Hist 313 US Foreign Relations, 1750–1912
- Hist 414 Motivations of American Foreign Policy
IR Concentrators entering Cornell in fall 1994 and after are expected to complete additional language study beyond the College of Arts and Sciences degree requirement. This study can be accomplished in one of two ways:

1) Two years of one foreign language (proficiency plus one course)
2) Two languages at proficiency

**Requirements for students entering Cornell prior to fall 1994:**

1) Two courses in government:
   a) Government 181 or 281: Introduction to International Relations (spring).
   b) One appropriate 300-level government course, either in international relations or in the foreign policy of a particular country.

2) Two courses in economics:
   a) One from the following offerings: Economics 361: International Trade Theory and Policy (fall); Economics 362: International Monetary Theory and Policy (spring); Economics 363: International Economics (fall); Economics 371: Economic Development (fall).
   b) One from the following offerings: Economics 366: The Economies of Central Europe and the Former USSR (spring); Economics 367: Comparative Economic Systems (spring); Economics 370: Socialist Economies in Transition (fall); Economics 374: National and International Food Economics (spring).

3) Two courses in history:
   a) History 314: History of American Foreign Policy, 1912 to the Present (spring).
   b) Any history course dealing with a modern nation or region other than the United States.

Typical choices among the sequences listed above would be to study European history and government and Economics 361, 362, or 367, or Third World history and government and Economics 371 and other listed economics courses. Under certain conditions, it may be possible to substitute other courses for those listed above. In addition, students are strongly encouraged to acquire full proficiency in a modern foreign language.

**Study Abroad**

IR Concentrators are strongly encouraged to study abroad to bring a practical dimension to their expertise in international issues. Those who choose this option will find the requirements for the concentration highly compatible with study abroad.

All courses used to fulfill the concentration requirements must be taken for a letter grade.

**Language Requirement**

IR Concentrators entering Cornell in fall 1994 and after are expected to complete additional language study beyond the College of Arts and Sciences degree requirement. This study can be accomplished in one of two ways:

1) Two years of one foreign language (proficiency plus one course)
2) Two languages at proficiency

**Requirements for students entering Cornell prior to fall 1994:**

1) Two courses in government:
   a) Government 181 or 281: Introduction to International Relations (spring).
   b) One appropriate 300-level government course, either in international relations or in the foreign policy of a particular country.

2) Two courses in economics:
   a) One from the following offerings: Economics 361: International Trade Theory and Policy (fall); Economics 362: International Monetary Theory and Policy (spring); Economics 363: International Economics (fall); Economics 371: Economic Development (fall).
   b) One from the following offerings: Economics 366: The Economies of Central Europe and the Former USSR (spring); Economics 367: Comparative Economic Systems (spring); Economics 370: Socialist Economies in Transition (fall); Economics 374: National and International Food Economics (spring).

3) Two courses in history:
   a) History 314: History of American Foreign Policy, 1912 to the Present (spring).
   b) Any history course dealing with a modern nation or region other than the United States.

Typical choices among the sequences listed above would be to study European history and government and Economics 361, 362, or 367, or Third World history and government and Economics 371 and other listed economics courses. Under certain conditions, it may be possible to substitute other courses for those listed above. In addition, students are strongly encouraged to acquire full proficiency in a modern foreign language.
JWST 251 The Holocaust: The Destruction of European Jewry
Fall. 3 credits. Enrollment limited to 100 students. H. Abramson.
This course will survey the social and political evolution and implementation of the Nazi program to destroy European Jewry. The emphasis will be placed on an historical overview of the political and physical machinery of the destruction process and its impact on both the practitioners and victims. Topics relevant to the post-Holocaust era, including revisionism and the hunt for prosecution of war criminals, will also be introduced. The role of the perpetrators, victims, and bystanders will be highlighted.

JWST 294 Modern History of the Near East: Changing Politics, Society, and Ideas (also GOVT 358 and NES 294) @
Fall. 4 credits. Fulfills the college distribution requirement in history or the social sciences. E. Zisser.
For description, see NES 294.

JWST 301–302 Advanced Modern Hebrew I and II (also NES 301–302) @
Fall 301; fall 302; spring. 4 credits. N. Scharf.
For description, see NES 301–302.

JWST 339 Muslims, Christians and Jews in Islamic Spain: Literature and Society (also NES 339, COMP LIT 334, RELST 334, and SPAN LIT 339) @
Spring. 4 credits. Enrollment limited to 20 students. R. Brann.
For description, see NES 339.

JWST 342 Jewish Mysticism (also RELST 344 and NES 344) @
Spring. 4 credits. Enrollment limited to 25 students. R. Lesses.
For description, see NES 344.

JWST 345 Letter, Novel, Dictionary: The Making of National Language (also NES 345) @
Fall. 4 credits. Enrollment limited to 25 students. I. Tucker.
For description, see NES 343.

JWST 347 Gender and Judaism (RELST 343 and NES 345) @
Fall. 4 credits. Enrollment limited to 25 students. R. Lesses.
For description, see NES 345.

JWST 350 The Jews of the Territory of the Soviet Union from 1861 to the Present
Spring. 4 credits. H. Abramson.
This course will survey the transformation of the Jewish minority in the territory of the former Soviet Union from late Czarist times through the fall of Communism in Eastern Europe. The social and economic makeup of pre-revolutionary Jews will be studied as a prelude to the sweeping changes brought about by the Bolshevik Revolution of 1917. Topics to be discussed include the pogroms of 1919, Soviet-Jewish culture, the purges, Zionist and religious dissidence, and the Holocaust. Emphasis will be placed on the understanding of the Jewish experience in the context of other nationalities (Russians, Ukrainians, Poles, etc.). The course will conclude with a brief survey of the post-Soviet Jewish situation in the various successor states.
**Freshman Writing Seminars**

For freshmen the program offers the freshman writing seminars—more than 125 different courses in the humanities, social sciences, expressive arts, and sciences. Freshman writing seminars help students write good English expository prose—prose that, at its best, is characterized by clarity, coherence, intellectual force, and stylistic control. These seminars teach writing within a field while offering freshmen the opportunity to participate in a small seminar. Although they differ widely in content, all seminars adhere to the following requirements:

1. At least six—and at most, about fourteen—formal written assignments on new topics. Assignments should form a logical sequence.
2. At least two assignments asking for a seriously rewritten (not merely edited) essay. Assignments for guidelines 1 and 2 should total a minimum of thirty pages.
3. Ample, regular classroom time spent on work directly related to writing.
4. Reading assignments in the course subject small enough—maximum 75 pages per week—to permit regular, concentrated work on writing.
5. At least two individual conferences.

Offers change from semester to semester. Each term's freshman writing seminars are described in a brochure available from college registrars.

To ensure that students will enjoy the benefits of small writing classes, freshmen writing seminars are limited to no more than seventeen students. Instead of pre-enrolling in their writing courses, students request placement in one of five writing seminars by filling out ballots available from their college registrars. Over ninety percent receive one of their top three choices. In the fall, students may change their writing seminars at the Freshman Writing Seminar Exchange; and in the spring, students may change their writing seminars at the University Course Exchange. Changes can also be made at special Freshman Writing Seminar add/drop sessions held during the first two weeks of each semester.

The colleges and the school served by the John S. Knight Writing Program must approve students who score "4" or "5" on the Princeton Advanced Placement Examination in English receive three credits. Such credits are awarded automatically; students need only apply to the John S. Knight Writing Program or the Department of English is necessary. How these credits may be applied to freshman writing or other distribution requirements depends on the student's college and score. All students who score "5" except Architecture and Fine Arts students, may apply their three credits toward the writing requirements of their college. Of students who score "4," only Agriculture and Life Sciences students and Industrial and Labor Relations students may apply their three credits toward the writing requirements of their college. Students should always consult their college registrars to be certain that they understand their writing requirements.

Students who have already taken a freshman writing seminar, or who score "4" or "5" on the Princeton AP exam, or "700" or better on the English Composition or CEEB tests, may enroll, space permitting, in the following upper-level freshman writing seminars:

- English 227, 228, 217, and 218

Although there are no exemptions from college writing requirements, some students may fulfill all or part of their college's writing requirement through transfer credits or writing-course substitutions.

For work done at other institutions to be accepted as equivalent to freshman writing seminars, students should demonstrate that they have done a reasonably equivalent amount of writing in a formal course. (It is not sufficient to write, for example, one thirty-page term paper.) Students in the College of Engineering and the College of Arts and Sciences must file an "application for transfer evaluation" to request writing credit for such courses; students in other colleges should consult their college registrars.

In unusual circumstances, upper-level students may petition to use a Cornell writing course other than a freshman writing seminar to satisfy part of their writing requirement. The John S. Knight Writing Program must approve all such petitions in advance.

For information about the requirements for freshman writing seminars and descriptions of seminar offerings, consult the John S. Knight Writing Program brochure, available from college registrars in August for the fall term and in late October for the spring term.

**Teaching Writing**

Each summer and fall, the program offers instruction in the teaching of writing to new staff members in the John S. Knight Writing Program and other interested instructors.

Teaching Writing I, offered in the summer, is primarily a course for graduate students; the same course is offered in the fall as Teaching Writing II. The program also sponsors a summer apprenticeship program for a limited number of graduate students, and a summer seminar for faculty members interested in the teaching of writing.

**Writing Workshop**

The John S. Knight Writing Program offers Workshops in English Composition for freshmen (or transfer students needing writing credit) through the Writing Workshop. These tutorials in English composition are designed to help students write with more confidence and skill in all disciplines, while provoking inquiry into particular areas of study, forms or uses of writing, or topics intimately related to the written medium. Students may choose among a variety of sections focusing on such themes as "Writing about the Social World," "Writing in the Humanities," "Issues and Audiences," "Understanding the News," and "The Languages of Science."
for students who have had little training in composition or who have serious difficulty with writing assignments.

Writing 127 and 138 are graded S-U only, and students receiving a grade of S are normally granted credit toward their college writing requirements. Students who think this course might be appropriate, including non-native speakers of English scoring less than 600 on the Test of English as a Foreign Language (TOEFL), should attend the assessment sessions offered by the Writing Workshop during orientation week each fall. The workshop also offers a walk-in service (see below) to help students with problems in essay writing. The director is Joe Martin, senior lecturer in the Writing Workshop. The workshop offices are in 174 Rockefeller Hall, 255-6349.

The Walk-In Service

Through the Walk-In Service, the Writing Workshop offers tutoring assistance in writing to any student who needs help with a writing project. The Walk-In Service has tutors available during the academic year in 174 Rockefeller and north- and west-campus residential areas. The director is Mary Gilliland. For information contact the Writing Workshop, 174 Rockefeller Hall, 255-6349.

WRIT 137-138 Workshops in English Composition

137, fall, 138, spring. 3 credits each term. Each section limited to 12 students. S-U grades only.

An intensive writing experience, this course is designed for those whose composition skills need extra attention. In class discussion, students respond to each other's work and analyze brief additional readings. The average weekly syllabus includes small classes, a tutorial with the instructor, and a paper plus revision. Each section of this course is individually shaped to respond to the needs of students in that particular class.

Latin American Studies


137, fall; 138, spring. 3 credits each term. Students respond to each other's work and analyze brief additional readings. The average weekly syllabus includes small classes, a tutorial with the instructor, and a paper plus revision. Each section of this course is individually shaped to respond to the needs of students in that particular class.

The Latin American Studies Program encourages and recognizes faculty and student interests in Latin America. A variety of special lectures, films, and seminars supplement the regular course offerings. Undergraduate students may arrange an independent major in Latin American studies, and graduate students may pursue a minor in Latin American studies while majoring in the graduate field of their choice. The College of Arts and Sciences offers Latin American studies courses in anthropology, economics, government, history, and sociology. In addition, there is a varied language, literature, and linguistics curriculum in Spanish, Portuguese, and Quechua. The student may also pursue Latin American studies in the College of Agriculture and Life Sciences; the College of Architecture, Art, and Planning; the College of Human Ecology; and the School of Industrial and Labor Relations.

For further information and a current course listing, students should contact the program office at 255-3345 or 190 Uris Hall.

Law and Society

P. R. Hyams, director, 307 McGraw Hall, 255-2076, ph3@cornell.edu, C. Carmichael (comparative literature), D. A. Dunning (psychology), G. Hay (economics), P. Hyams (history), S. Jasnoch (science and technology studies), M. Katzenstein (government), R. Miller (philosophy), M. B. Norton (history), R. Polenberg (history), D. Powers (Near Eastern studies), J. Rakbin (government), L. Scheinman (government)

The Law and Society Program offers an interdisciplinary concentration for undergraduates who are interested in the law from the perspectives of the social sciences and the humanities: anthropology, comparative literature, economics, government, history, philosophy, psychology, science and technology studies, and sociology. In addition, undergraduates in the College of Arts and Sciences can major in law and society through the Independent Major Program. Students who wish to graduate with a concentration in law and society should consult the director of the program or one of the advisers listed above to plan a coherent program of study. Such a program should ordinarily include at least four courses from the following list. Particular attention is drawn to GOVT 313 and PSYCH 265, which past students have often taken. Other courses may be substituted with the approval of the adviser. Inquiries can be directed to: Mary Newhart, Administrative Assistant, 119 Stimson Hall, 255-6515, mjn3@cornell.edu.

AS&R 280 Racism in American Society

ANTHR 385 Sex, Morality, and the Law (also WOMNS 385) @

B&SOC 406 Biotechnology, Society, and Law (also S&TS 406)

B&SOC 407 Law, Science, and Public Values (also GOVT 407 and S&TS 407)

COM L 326 Christianity and Judaism (also RELS 326) #

COM L 328 Literature of the Old Testament (also RELS 328) @ #

ECON 304 Economics and the Law

ECON 335 Public Finance and Resource Allocation

ECON 336 Public Finance: Resource Allocation and Fiscal Policy

ECON 354 Economics of Regulation

GOVT 111 The Government of the United States

GOVT 260 Social and Political Theory (also PHIL 242)

GOVT 294 Global Thinking (also PHIL 294)

GOVT 313 The Nature, Functions, and Limits of Law

GOVT 324 Legal Reasoning and Legal Adaptation: A Comparison of American and Talmudic Law

GOVT 327 Civil Liberties in the United States

GOVT 328 Constitutional Politics: The United States Supreme Court

GOVT 364 The Selfish Individual and the Modern World

GOVT 389 International Law

GOVT 407 Law, Science, and Public Values (also B&SOC 407 and S&TS 407)

GOVT 412 Voting and Political Participation

GOVT 428-429 Government and Public Policy: An Introduction to Analysis and Criticism

GOVT 462 Modern Political Philosophy (also PHIL 346)

GOVT 466 Feminism and Gender Discrimination

GOVT 469 Limiting War: The Morality of Modern State Violence (also PHIL 369)

GOVT 489 International Law and Regime Development

HIST 226 Comparative Politics: The World in Transition

HIST 236 The American Ethos of Entrepreneurialism: Capitalism and Society in Developing America

HIST 288 Marriage and Sexuality in Medieval Europe (also WOMNS 288) #

HIST 436 Conflict Resolution in Medieval Europe

HIST 437-657 Sexuality, Society, and the State in the Near East (also NES 456-657 and WOMNS 455-655) @

NES 357 Islamic Law and Society

NES 456-657 Sexuality, Society and the State in the Near East (also HIST 437-657 and WOMNS 455-655) @ #

PHIL 242 Social and Political Theory (by petition for breadth requirement) (also GOVT 260)

PHIL 294 Global Thinking (also GOVT 294)

PHIL 319 Philosophy of Marx #

PHIL 342 Law, Society, and Morality (also Law 666)

PHIL 343 Political Obligation and Civil Disobedience (also Law 676)

PHIL 346 Modern Political Philosophy (also GOVT 462)

PHIL 369 Limiting War: The Morality of Modern State Violence (also GOVT 469)

PHIL 444 Contemporary Legal Thought (also Law 710)
Graduate Seminars

Courses in various aspects of medieval studies are offered each year in numerous cooperating departments, including Classics, Comparative Literature, English, History, History of Art, Modern Languages and Linguistics, German Studies, Romance Studies, Russian Literature, Music, Asian Studies, Near Eastern Studies, and Philosophy, and by the Society for the Humanities. An up-to-date listing of courses and their descriptions is available at the Medieval Studies office.

Modern European Studies Concentration

Susan Tarrow, coordinator

Students from any college may choose an undergraduate concentration in Modern European Studies to complement any major in any college. The purpose of the concentration is to provide a coherent structure for students with an interest in interdisciplinary study in the field of European studies.

The concentration has three tracks: European politics, economics and society; modern European history, and European culture. The requirements for the concentration are:

1) Competence in at least one modern European language, Romance, Germanic or Slavic (i.e., completion of a 300-level course or equivalent with a grade of at least B-, or demonstration of an advanced level of competence in an oral proficiency interview test where available).

2) Completion of at least one course in each of the three areas listed below:

   a) European Politics, Society and Economics

      Anthr 350 Anthropology of Europe
      Econ 367 Comparative Economic Systems: Soviet Union and Europe
      Econ 370 Socialist Economies in Transition
      Govt 325 Eastern European Politics
      Govt 332 Western European Politics
      Govt 338 European Political Development
      Govt 342 The New Europe
      Govt 350 Comparative Revolutions
      Soc 366 Transitions from State Socialism

   b) Modern European History

      Hist 242 Europe since 1789
      Hist 353 Nineteenth-Century European Intellectual History
      Hist 354 Twentieth-Century European Intellectual History
      Hist 362 European Cultural History 1815-1870
      Hist 363 European Cultural History 1870-1945
      Hist 383 Europe 1900-1945
      Hist 384 Europe 1945-68
      Hist 385 Europe 1968-1990

   c) Humanities

      Any general course dealing with modern Europe (19th and 20th centuries) in one of the following departments: Comparative Literature, English, German Studies, History of Art, Music, Philosophy, Romance Studies, Theatre Arts. Examples of such courses include:

      ArtH 260 Introduction to Art History: The Modern Era
      ArtH 361 Nineteenth-Century European Art
      COML 202 Great Books
      COML 364 The European Novel
      Music 108 Bach to Debussy
      Music 274 Opera
      Music 383 Music of the Nineteenth Century
      Phil 212 Modern Philosophy
      Theatr 241 Introduction to Western Theatre II

Under certain conditions, it may be possible to substitute other courses for those listed above.

3) Three additional courses in any of the three areas.

   a) Courses in European and comparative politics, anthropology, sociology, women's studies, and related courses in the School of Hotel Administration, the College of Agriculture and Life Sciences, and the School of Industrial and Labor Relations.

   b) Courses in modern European history (post-1789).

   c) Courses in (post-1789) English and European literatures, comparative literature, semiotics, fine arts, architecture, music, philosophy, film and theatre arts, and women's studies. All concentrations are encouraged to participate in the Language House Program, and to spend a semester or more in a program of study in Europe. Courses taken abroad may be applied to the concentration if they are approved for Cornell credit.

Undergraduates in the College of Arts and Sciences can major in European Studies through the Independent Major or College Scholar programs.

For a list of relevant courses and seminars, departmental advisers, and any further information, contact Susan Tarrow, coordinator of the Modern European Studies Concentration, at the Institute for European Studies, 120 Uris Hall (telephone 255-7592).
Religious Studies


The program in Religious Studies is designed to meet the needs of three classes of students: those seeking interesting courses on religious topics as free electives or to fulfill distribution requirements; those desiring a more systematic exposure to the study of religion as a major component of their liberal arts experience; and those planning to pursue advanced academic work in religious studies or allied disciplines or subdisciplines (e.g., history of religion, anthropology, religion and literature, religion and psychology, ethics, or theology, as well as certain geographical area studies). To all these students the program offers an opportunity to acquire a fuller understanding and appreciation of one of the most fundamental aspects of human thought and behavior.

The Major in Religious Studies

To graduate as a major in Religious Studies a student must (1) complete with letter grades the following courses: Religious Studies 101 (Understanding the Religions of the World) and Religious Studies 449 (History and Methods of the Academic Study of Religion); and (2) complete with letter grades eight additional courses approved for the major, at least four of them at the 300 level or above. The following specifications of this second requirement are designed to promote breadth (2a) and depth (2b) of study.

(2a) At least four of a major's eight additional courses are to be selected to ensure some familiarity with two or more different religions, religious traditions, or religious phenomena. These courses may be at the introductory or advanced levels. For example, "Introduction to Asian Religions" (Asian Studies 250) might lead a student to take "The Religious Traditions of India" (Asian Studies 351), and then to combine these with the two "Medieval Culture" courses (History 365 and 566). Or a student might take four unrelated courses such as "Introduction to the Bible" (Near Eastern Studies/Jewish Studies 223), "Religion and Reason" (Philosophy 263), "Myth, Ritual, and Symbol" (Anthropology 320), and "Islamic History: 1258-1914" (Near Eastern Studies 250) to gain a sense of the range of intellectual activity associated with the academic study of religious traditions and religious practices.

(2b) At least two of these eight additional courses are to be selected to ensure depth of coverage in one religion or one group of closely related religions, religious traditions, or religious phenomena. In the first illustrative case described above, the student might combine "The Religious Traditions of India" with "Indian Meditation Texts" (Asian Studies 460) or "Classical Indian Philosophical Systems" (Asian Studies/Classics 395) to acquire a measure of specialist strength in the religions of India. Alternatively, that student might combine "Introduction to Asian Religions" with one or more courses dealing with Buddhism, such as "Chinese Buddhism" (Asian Studies 358) or "Japanese Buddhism" (Asian Studies 359), to develop an appropriate depth along a different dimension.

No more than one of the courses chosen to meet requirement 2a may be used to satisfy requirement 2b.

To engage in the kind of focused study envisioned under 2b, a student will be expected to attain proficiency in a language other than English to gain access to relevant sources, primary or secondary. For example, a knowledge of Greek or Latin might be required for the study of Christianity (as well as Greek or Roman religions); of Hebrew or Aramaic for Judaism; of Arabic for Islam; of Sanskrit or Hindi for Hinduism; of Pali or Chinese for Buddhism. Religious phenomena like shamanism or totemism, though less firmly rooted in literary traditions, have generated substantial bodies of important scholarship in French and German, and an undergraduate major concentrating in this area of Religious Studies should be equipped to make independent use of such material. Courses used to satisfy this foreign-language proficiency requirement may not be applied to the course requirements described under 2a and 2b.

Most courses approved for the major are offered by cooperating departments within the College of Arts and Sciences; a comprehensive up-to-date list of these courses is maintained at the office of the Religious Studies Program, 330 Rockefeller Hall.

Given the multidisciplinary character of the program in Religious Studies, it is especially important for a prospective major to select a faculty adviser early on. A current list of advisers is available from the program director. Once an adviser has been selected, a student is expected to prepare a brief statement outlining his or her intended course of major study (including study of an appropriate foreign language) and to file it with the program director for review by the faculty committee responsible for overseeing the program.

The Major with Honors in Religious Studies

To be eligible for honors in Religious Studies, a student must maintain a GPA of 3.0 overall and 3.3 in courses other than language courses used to satisfy requirements for the major. In addition, he or she must enroll in Religious Studies 490 or 491 (Directed Study) and Religious Studies 495 (Honors Thesis), usually in the fall and spring of the senior year, respectively. Each course carries four credits but only the first may be counted as one of the eight additional courses required for the major. Religious Studies 490, 491, and 495 are supervised by cooperating faculty members assigned to individual honors students or small groups of honors students to help them complete substantial independent projects. These projects will be evaluated by the Religious Studies Honors Committee, which is responsible for awarding honors and determining the degree of honors awarded.

Courses Approved for the Major Sponsored by Religious Studies

RELST 101 Understanding the Religions of the World @# Spring. 3 credits. D. Gold.
A team-taught introduction to the contemporary study of religion and the religious traditions of the world. Topics covered include personal piety, mysticism, myth, development of religious institutions, and growth of scriptural canon. Required for majors in Religious Studies.

RELST 130 The Search for the Historical Jesus (also NES 130) @# Summer. 3 credits. S. Saraydar.
Who was Jesus? What did he really say and do? In this course we are concerned with the ways in which scholars approach these questions and the often startling answers they obtain. We examine the social, political, economic and religious environments in which Jesus operated to provide a context for critical readings of the Gospels of Mark, Matthew, Luke, John and Thomas and other early Christian texts. We then reconstruct the essential features of the original Jesus movement, which we compare and contrast with Cynic philosophy, the Greco-Roman gender system, the beliefs and practices of the early Church, and the social patterns and religious philosophies of small-scale societies.

RELST 230 Introduction to the Bible Fall. 3 credits. C. Carmichael.
RELST 236 Aramaic and Hebrew History Fall. 3 credits. L. Kant.
RELST 247 Introduction to Jewish Art and Archaeology Fall. 3 credits. I. L. D. Powers.
RELST 248 Introduction to Jewish Religion Fall. 3 credits. R. Lesses.
RELST 250 Introduction to Asian Religions Fall. 3 credits. J. M. Law.
RELST 252 Introduction to Islam Religion, Politics, and Society Spring. 3 credits. A. W. A. Baer Jr.
RELST 257 Islamic History 600-1258 Fall. 3 credits. D. Powers.
RELST 260 Knowledge and the Sacred in Small-Scale Societies @ Summer. 3 credits. Not offered 1995-96; next offered 1997. S. Saraydar.
RELST 263 The Earlier Middle Ages Fall. 4 credits. J. J. John.
RELST 322 Magic, Myth, Science and Religion Fall. 4 credits. T. Kirsch.
RELST 327 Missions of Paul and His Successor Fall. 4 credits. L. Cant.
RELST 328 Literature of the Old Testament Fall. 4 credits. C. Carmichael.
RELST 337 The Medieval Illuminated Book Fall. 4 credits. R. G. Calkins.
### RELST 343 Gender and Judaism
Fall. 4 credits. R. Lesses.

### RELST 344 Jewish Mysticism

### RELST 345 Intellect/Cultural Life 19th Century
Fall. 4 credits. R. L. Moore.

### RELST 349 Tantaric Traditions
Fall. 4 credits. D. Gold.

### RELST 355 Japanese Religions
Fall. 4 credits. J. M. Law.

### RELST 420 Read in Biblical Hebrew Prose
Fall. 4 credits. G. Rendsburg.

### RELST 421 Religious Reflections on the Human Body

### RELST 422 Old Testament Seminar

### RELST 428 Medieval Hebrew Biblical Exegese

### RELST 429 Readings in the New Testament
Fall. 4 credits. J. Bishop.

### RELST 442 Religion and Politics in American History
Fall. 4 credits. R. L. Moore.

### RELST 449 History and Methods of the Academic Study of Religion
Fall. 4 credits. Prerequisite: completion of or concurrent enrollment in a course (other than a language course) approved for the major in Religious Studies. Permission of instructor required. Not offered 1995–96. Designed to provide a working familiarity with major methodological issues in the academic study of religion. The first half explores nineteenth-century Religionsschaff as a nonsectarian, academic approach to religious phenomena and texts. The second half surveys approaches currently in use, with illustrative readings associated with anthropology, hermeneutics, history, history of religions, literary studies, phenomenology, philosophy, sociology, and theology. Required for majors in Religious Studies.

### RELST 451 Seminar in Islamic History
Spring. 4 credits. Enrollment limited to 25 students. D. Powers.

### RELST 490–491 Directed Study
490, 491; fall, spring. 2–4 credits each term. Staff.

### RELST 495 Honors Essay
Fall or spring. 4 credits. Staff.

### RELST 531 Problems in Medieval Art and Architecture
Fall. 4 credits. R. Calkins.

### Courses Approved for the Major Sponsored by Other Units

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Fall</th>
<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART H 437 The Medieval Illuminated Book</td>
<td>4</td>
<td>R. G. Calkins.</td>
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<tr>
<td>ASIAN 250 Introduction to Asian Religions</td>
<td>3</td>
<td>J. M. Law.</td>
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<tr>
<td>ASIAN 251 Tantric Traditions</td>
<td>4</td>
<td>D. Gold.</td>
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<tr>
<td>CLASS 433 Greek Mystery Cults</td>
<td>4</td>
<td>Not offered 1995–96; prerequisite: one term of 300-level Greek or permission of instructor. K. Clinton.</td>
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</tr>
<tr>
<td>COM L 328 Literature of the Old Testament</td>
<td>4</td>
<td>C. M. Carmichael.</td>
<td></td>
</tr>
<tr>
<td>HIST 263 The Earlier Middle Ages</td>
<td>4</td>
<td>J. J. John.</td>
<td></td>
</tr>
</tbody>
</table>
[HIST 385 Medieval Culture, 400-1150 #
Spring. 4 credits. Prerequisite: History 263 or instructor’s permission. Not offered 1995-96. J. J. John.]

[HIST 461/571 Seminar in Islamic History

[HIST 366 Medieval Culture, 1100-1300 #
Spring. 4 credits. Prerequisite: History 264 or instructor’s permission. Not offered 1995-96. J. J. John.]

[NTRES 407 Religion, Ethics, and the Environment
Spring. 4 credits. Not offered 1995-96. R. A. Baer, Jr.]

[NTRES 411 Seminar in Environmental Ethics
Fall. 3 credits. Open to graduate students, juniors and seniors. R. A. Baer, Jr. Topic for 1995-96: Animal Welfare/Rights.]

[NES 152 Introduction to Islam: Religion, Society and Politics #
Spring. 3 credits. Not offered 1995-96. D. Powers.]

[NES 197 Introduction to Near Eastern Civilization #
Fall. 3 credits. Not offered 1995-96. R. Brann.]

[NES 198 Introduction to Near Eastern Civilization #
Spring. 3 credits. R. Brann.]

[NES 220 The Greek New Testament
Spring. 3 credits. Not offered 1995-96. L. Kant.]

[NES 223 Introduction to the Bible @
Fall. 3 credits. G. Rendsburg.]

[NES 227 Introduction to the Prophets @
Spring. 3 credits. Not offered 1995-96. G. Rendsburg.]

[NES 228 Genesis @
Spring. 3 credits. Not offered 1995-96. G. Rendsburg.]

[NES 246 Seminar in Jewish Mysticism #
Spring. 3 credits. Not offered 1995-96. S. T. Katz.]

[NES 247 Introduction to Jewish Art and Archeology @
Fall. 3 credits. L. H. Kant.]

[NES 248 Introduction to Classical Jewish History @
Fall. 3 credits. Limited to 50 students. Staff.]

[NES 251 Introduction to Islam: Religion, Politics and Society #
Spring. 3 credits. Not offered 1995-96. Staff.]

[NES 257 Islamic History: 600-1258 @
Fall. 3 credits. D. Powers.]

[NES 258 Islamic History: 1258-1914 @
Spring. 3 credits. Not offered 1995-96. L. Pierce.]

[NES 263 Introduction to Biblical History and Archeology @

[NES 281 Gender and Society in the Muslim Middle East @
Spring. 3 credits. Not offered 1995-96. L. Pierce.]

[NES 324 History of Early Christianity: Jesus to Augustine @
Fall. 4 credits. Not offered 1995-96. L. H. Kent.]

[NES 339 Muslims, Christians, and Jews in Islamic Spain: Literature and Society @
Spring. 3 credits. Not offered 1995-96. R. Brann.]

[NES 340 Judaism and Christianity: A Historical and Theological Encounter @
Spring. 4 credits. Limited to 20 students. Not offered 1995-96. S. T. Katz.]

[NES 344 Jewish Mysticism
Spring. 4 credits. Not offered 1995-96. R. Lesses.]

[NES 345 Gender and Judaism
Fall. 4 credits. R. Lesses.]

[NES 351 Introduction to Islamic Law @

[NES 393 Religion and Politics in the Middle East @
Fall. 4 credits. Limited to 25 students. Not offered 1995-96. M. Livak.]

[NES 418/618 Seminar in Islamic History: Muhammed and the Rise of Islam @
Fall. 4 credits. Limited to 20 students. Not offered 1995-96. D. Powers.]

[NES 420 Readings in Biblical Hebrew Prose @
Fall. 4 credits. G. Rendsburg.]

[NES 421 Readings in Biblical Hebrew Poetry @
Spring. 4 credits. Not offered 1995-96. G. Rendsburg.]

[NES 428 Medieval Hebrew: Biblical Exegesis @
Fall. 4 credits. Not offered 1995-96. R. Brann.]

[NES 451 Seminar in Islamic History
Spring. 4 credits. Enrollment limited to 25 students. D. Powers.]

[NES 627 The Song of Songs
Fall. 4 credits. Graduate level or permission of instructor. Not offered 1995-96.]

[PALL 131-132 Introduction to Pali: The Word of the Buddha
131 fall; 132 spring. 3 credits each term.]

[PHIL 213 Existentialism
Fall. 4 credits. A. Wood.]

[PHIL 214 Philosophical Issues in Christian Thought @
Spring. 4 credits. Not offered 1995-96. N. Ketzerzmann.]

[PHIL 263 Religion and Reason
Spring. 4 credits. Not offered 1995-96. S. MacDonald.]
include sources in Russian or an Eastern European language.

III. Students may earn a total of eight credits for the courses in the honors program and should register for the appropriate number in the department of their major adviser.

IV. Ordinarily, in the first term of the senior year, students who meet the prerequisites will do independent research and reading in a particular area under supervision of their major adviser.

V. In the second term of the senior year students will complete the honors project by a date set by the Slavic and East European Studies Program. Students should keep their committee members informed as their work progresses. Students will meet together with their whole honors committee to discuss the draft of the thesis or project and make recommendations for revision. When the project is completed, the committee will decide whether the project deserves honors, and, if so, after reviewing their academic record, will recommend students for a Bachelor of Arts "cum laude, magna cum laude, or summa cum laude. The committee will also assign a grade for the honors research course.

Courses

[COM L 337 Modern and Contemporary Theatre (also Theatre Arts 335)]
Spring. 4 credits. Not offered 1995-96.

COM L 367 The Russian Novel (also Russian Literature 367) #
Fall. 4 credits.

[COM L 381 Marxist Cultural Theory (also German Literature 381 and Government 372)]

COM L 385 Reading Nabokov (also Russian Literature 385 and English 379)
Fall. 4 credits. Limited to 25.

[COM L 389 Modern Literature in Poland, Czechoslovakia, Hungary, and Yugoslavia (also Russian Literature 389)]
Fall. 4 credits. Not offered 1995-96.

COM L 425 The Jew's Body (also Comparative Literature 625, German Studies 422/622 and Jewish Studies 422/622)
Spring. 4 credits. Readings will be primarily in English, though knowledge of another language (such as Hebrew and Yiddish or languages of the European Diaspora, such as German, Italian, French, Russian, Polish, etc.) could be helpful in certain contexts.

[COM L 690 Marxism and Contemporary Theory]

CZECH 131-132 Elementary Czech
131, fall; 132, spring. 3 credits.

CZECH 133-134 Continuing Czech
133, fall; 134, spring. 3 credits.

ECON 329 Eastern Europe Today: Economics, Government, Culture (also Government 326 and Russian Literature 329)
Fall. 4 credits. Not offered 1995-96.

ECON 366 The Economics of Central Europe and of the Former Soviet Union: from Central Planning to Markets
Fall or spring. 4 credits.

ECON 367 Comparative Economic Systems: East and West
Fall or spring. 4 credits.

ECON 370 Socialist Economies in Transition
Fall or spring.

ECON 381 Economics of Participation and Workers' Management
Fall or spring. 4 credits.

ECON 382 The Practice and Implementation of Self-Management
Fall or spring. 4 credits.

ECON 681 Economics of Participation and Self-Management
Fall or spring. 4 credits.

ECON 682 Seminar on Economics of Participation and Labor-Managed Systems
Fall or spring. 4 credits.

[GERST 376 Contemporary Soviet Latvian Literature]
Fall. 4 credits. Taught in Latvian. Not offered 1995-96.

[GERST 377 Baltic Literature]
Fall. 4 credits. Not offered 1995-96.

[GERST 381 Marxist Cultural Theory (also Comparative Literature 381 and Government 372)]

[GOVT 100.8 Power and Politics: The New Eastern Europe]

[GOVT 231 Introduction to Comparative Government and Politics]
Spring. 4 credits.

[GOVT 232 Government and Politics of Eastern Europe]

[GOVT 326 Eastern Europe Today: Economics, Government, Culture]

[GOVT 330 The Soviet Union: Politics, Economics, and Culture]
Not offered 1995-96.

[GOVT 333 Government and Politics of the Former Soviet Union]

[GOVT 337 Marxism, Communism and Revolution]

GOVT 342 The New Europe
Spring. 4 credits.

GOVT 350 Comparative Revolutions
Spring. 4 credits.

GOVT 359 Soviet Foreign Policy

GOVT 376 Rethinking Marx

[GOVT 397 The United States and Russia]

[GOVT 399 International Relations in the Former Soviet Union]
Fall. 4 credits. Not offered 1995-96.

[GOVT 446 Comparative Communism]

[GOVT 481 Foreign Policy of the U.S.S.R.]


[GOVT 491 Superpower Security and Third World Conflicts]

[GOVT 637 Peasantry, State, and Revolutionary Socialism]

[GOVT 639 Politics of the Soviet Union]
Fall. 4 credits. Not offered 1995-96.

[GOVT 642 The Future of European Security]

[GOVT 646 Issues in State Socialism]
Not offered 1995-96.

[GOVT 657 Comparative Democratization]

GOVT 660 Social Movements, Collective Action, and Reform
Fall. 4 credits.

[GOVT 669 Modern Social Theory I]

GOVT 670 Modern Social Theory II
Spring. 4 credits.

HIST 218 The Russian Military Effort and Foreign Policy #
Fall. 3 credits.

[HIST 242 Europe Since 1789 #]

HIST 252 Russian History to 1800 #
Fall. 4 credits.

HIST 253 Russian History Since 1800 #
Spring. 4 credits.

HIST 290 Twentieth-Century Russia and the Soviet Union
Spring. 4 credits.

[HIST 352 The End of the Austro-Hungarian Monarchy, 1848-1919]

HIST 383 Europe 1900-1945
Fall. 4 credits.

[HIST 384 Europe, 1945-1968]
Fall. 4 credits. Not offered 1995-96.

HIST 385 Europe in the 20th Century: 1968-1990
Spring. 4 credits.

[HIST 415 The United States and Russia, 1780-1914 #]

[HIST 464 Russian Social History #]
Spring. 4 credits. Not offered 1995-96.

[HIST 485 The Historical Origin of the Post-Soviet Successor States]
Spring. 4 credits. Not offered 1995-96.

magnum cum laude
ARTS AND SCIENCES - 1995-1996

RUSSL 611 Supervised Reading and Research
Fall or spring. 2-4 credits.

RUSSL 617 Russian Stylistics I
Not offered 1995-96.

RUSSL 618 Russian Stylistics II
Not offered 1995-96.

RUSSL 619 Seventeenth-Century Russian Literature
Fall. 4 credits. Not offered 1995-96.

RUSSL 620 Twentieth-Century Russian Poetry
Spring. 4 credits. Not offered 1995-96.

RUSSL 621 Old Russian Literature
Spring. 4 credits. Not offered 1995-96.

RUSSL 622 Eighteenth-Century Russian Literature
Spring. 4 credits. Not offered 1995-96.

RUSSL 623 Early Nineteenth-Century Literature
Not offered 1995-96.

RUSSL 624 Russian Romanticism
Spring. 4 credits.

RUSSL 625 Russian Realism
Fall. 4 credits. Also open to advanced undergraduates with permission of instructor. Not offered 1995-96.

RUSSL 626 The Tradition of Russian Poetry
Spring. 4 credits. Not offered 1995-96.

RUSSL 630 Gogol
4 credits. Taught in Russian.

RUSSL 632 Russian Drama and Literature (also Theatre Arts 622)
Fall. 4 credits. Not offered 1995-96.

RUSSA 633-634 Russian for Russian Specialists
633, fall; 634, spring. 4 credits each term.

RUSSL 635 Modern Russian Literary Criticism
Spring. 4 credits. Not offered 1995-96.

RUSSL 650 Russian Intellectual History

RUSSL 651-652 Comparative Slavic Linguistics
651, fall; 652, spring. 4 credits each term.

RUSSL 669 Seminar: Dostoevsky
Fall. 4 credits. Not offered 1995-96.

RUSSL 671 Seminar in Nineteenth-Century Russian Literature
Spring. 4 credits.

RUSSL 672 Seminar in Twentieth-Century Russian Literature
Fall. 4 credits. Not offered 1995-96.

RUSSL 673 The Russian Nabokov
Fall. 4 credits. Not offered 1995-96. Also open to advanced undergraduates.

RUSSL 674 Solzhenitsyn and Literature of the Gulag
Fall. 4 credits. Not offered 1995-96.

RUSSL 675 Russian Literature, 1917-1945
Fall. 4 credits.

RUSSL 676 Russian Literature, 1945-Present
Spring. 4 credits. Not offered 1995-96.

RUSSL 688 Russian Symbolism

RUSSL 699 Russian Modernism

SEBGR 131-132 Elementary Serbo-Croatian
131, fall; 132, spring. 3 credits each term. Not offered 1995-96.

SEBGR 133-134 Continuing Serbo-Croatian
133, fall; 134, spring. 3 credits each term.

SOC 360 State and Society in Comparative Perspective

SOC 365 Comparative Perspectives on Socialist Societies and Economics

SOC 366 Transitions From State Socialism
Spring. 4 credits. Not offered 1995-96.

SOC 510 Comparative Societal Analysis
Fall. 4 credits.

SOC 583 Transitions to Market Economies in Eastern Europe (also Management NBA 583)
Spring. 4 credits.

[THETR 662 Russian Drama and Theatre (also Russian Literature 632)]

[THETR 663 Russian Films of the 1920s and French Films of the 1960s]
Spring. 4 credits.

S Hum 405 Perception and Cognition: Japanese Poetics, Painting, and Writing
Fall. 3 credits. Limited to 17 students.

S Hum 406 Perception and Cognition: Japanese Poetics, Painting, and Writing
Fall. 3 credits. Limited to 17 students.

The Society annually awards fellowships for research in the humanities. The Fellows offer, in line with their research, informal seminars intended to be exploratory or interdisciplinary. These seminars are open to graduate students, suitably qualified undergraduates, and interested auditors. Students who want credit for a seminar should formally register in their own college. Persons other than those officially enrolled may attend as visitors with permission of the Fellow. The theme for 1995/96 is Self, Subject, Agent.

S Hum 402 Medieval Political Individualism (also History 422)
Fall. 3 credits. Limited to 17 students.

Jennifer E. Whiting

A. Boureau.

The seminar deals with the religious genealogy of political individualism during the Late Middle Ages. After questioning the notions of individual, self, agent within history, the seminar will explore the rise of the notion of person, the debates about equality and privileges (as expressed through the discussions about the Immaculate Conception of Mary) and the first elaborations of the social covenant in Franciscan circles.

S Hum 403 The Cultural Production of the Person (also Anthropology 616)
Fall. 4 credits. Limited to 17 students.

The nature of the subject, self, or person in relation to culture or society is a concern that links the humanities and the social sciences. In recent years the notion that subjectivity is a "cultural construction," even an ideological delusion, has commanded the attention of literary critics, political theorists, and philosophers. The course addresses interdisciplinary debates and discussions in this regard from the comparative perspective of cultural anthropology. The aim of the seminar is to develop a conceptual apparatus adequate to the task of defining the actual processes and activities by means of which both cultural subjects and culture/society are produced.

S Hum 404 Topics in Moral Psychology (also Philosophy 442)
Fall. 4 credits. Limited to 17 students.

K. Jones.

"Reasons" explanations are explanations of a special sort: they explain why an agent did something by showing how, given her beliefs and desires at the time, it would have been a reasonable thing for her to do. The first part of this course sets out to understand just what sort of explanation a "reasons" explanation is. Next we examine the problem of incontinence, or weakness of will. Standard discussions of incontinence locate it as a problem that occurs in the space between decision and action. An agent decides where the all-things-considered best reasons lie, but then acts contrary to her decision. We will explore this and other forms of incontinence. Finally, we will examine accounts of autonomy and how well or badly they accommodate the fact that moral knowledge, like all knowledge, is social.

S Hum 405 Perception and Cognition: Japanese Poetics, Painting, and Writing
Fall. 3 credits. Limited to 17 students.

T. Lamarre.

This seminar will examine contemporary theoretical approaches to vision, speech, knowledge and representation, drawing on calligraphy, poetry, narrative scrolls, and iconography, primarily from traditional Japanese sources. The goal will be to develop
Proust, source of paralysis and despair. Both literary growth and intellectual development, or as a self-conception, considering especially how disappointment with ideals in love, work, and which various kinds of literature represent. This course will study the representation of Blake, Shelley, Ashbery, and Bishop; Johnson, disillusion. Readings may include: poems by hooks, Crenshaw, Williams, (Angela) Davis, Jordan, hooks, Crenshaw, Williams, Higginbotham, Webs, Robson, and Sedgwick).

If, following Nietzsche, Deleuze, and Foucault, we accept the basic argument that power can both reduce difference and multiply difference, what are the implications of their approach to power as a productive force for contemporary research on racial and sexual positioning? How are various hegemonized subject-positions "masculated," such that they lose their individuality, "monized," such that they become excessive monster figures, or "erased," such that their discourses are rendered invisible or incoherent? What are the linkages between this complex operation of authoritarian forces and the emergence of what has been called the "new racism," and what could be called the "new homophobia? To what extent does the analysis of these new authoritarian formations shed light on contemporary resistance strategies? The seminar will combine theoretical readings (Nietzsche, Deleuze, Foucault) with empirical material dealing with hegemonic representations of race and sexuality (Fanon, Said, Baldwin, Spillers, (Angela) Davis, Jordan, hooks, Crenshaw, Williams, Higginbotham, Webs, Robson, and Sedgwick).

Aside from its own thoroughly lurid appeal, the phenomenon of "interpellation," the process by which a subject-positions "massified," such that they lose their individuality, "monized," such that they become excessive monster figures, or "erased," such that their discourses are rendered invisible or incoherent? What are the linkages between this complex operation of authoritarian forces and the emergence of what has been called the "new racism," and what could be called the "new homophobia? To what extent does the analysis of these new authoritarian formations shed light on contemporary resistance strategies? The seminar will combine theoretical readings (Nietzsche, Deleuze, Foucault) with empirical material dealing with hegemonic representations of race and sexuality (Fanon, Said, Baldwin, Spillers, (Angela) Davis, Jordan, hooks, Crenshaw, Williams, Higginbotham, Webs, Robson, and Sedgwick).

S Hum 408 The Subject Possessed (also English 406 and 606) Fall. 4 credits. Limited to 17 students. C. Pye

Aside from its own thoroughly lurid appeal, the phenomenon of "interpellation," the process by which a subject-positions "massified," such that they lose their individuality, "monized," such that they become excessive monster figures, or "erased," such that their discourses are rendered invisible or incoherent? What are the linkages between this complex operation of authoritarian forces and the emergence of what has been called the "new racism," and what could be called the "new homophobia? To what extent does the analysis of these new authoritarian formations shed light on contemporary resistance strategies? The seminar will combine theoretical readings (Nietzsche, Deleuze, Foucault) with empirical material dealing with hegemonic representations of race and sexuality (Fanon, Said, Baldwin, Spillers, (Angela) Davis, Jordan, hooks, Crenshaw, Williams, Higginbotham, Webs, Robson, and Sedgwick).

This course considers the concept of violence in two different cultural contexts (the United States and Latin America) and from a range of perspectives: historical, literary, theoretical, and political. A central assumption is that violence has played a critical role in shaping discourses about the nation, everyday life, individual identity, and citizenship in the Americas. To explore how violence has been deployed as a cultural, political, and literary strategy we will focus on a variety of historical moments and dramas. For instance, we will examine the intersections of domestic and national violence with the relationship between violence and myth, and the significance of borders, and marginality as these are contested in struggles over such issues as slavery, family violence, transnational migration, sexual, racial, or ethnic identity. The course's temporal focus encompasses the period between the Wars of Independence and the early twentieth century.

Readings may include Sarmiento, Jose Eustagio Rivera, James Fennimore Cooper, Lippard.

S Hum 410 Introduction to Performance Studies (also Theatre Arts 338) Fall. 4 credits. D. Wilcox

An introductory survey of the development of the discipline. Performance Studies embraces a range of theatrical and para-theatrical activity explored through a range of methodologies, including anthropology, history, and cultural studies.

S Hum 407 The Construction and Critique of the Enlightenment Subject (also Comparative Literature 467, History 407 and French Literature 407) Spring. 3 credits. Limited to 17 students. H. Mah

This seminar examines the construction and criticism of Enlightenment subjectivity in both the eighteenth century and recent social theory and philosophy. We first consider how Enlightenment writers sought to fashion a self defined by a transparent and socially unselfed rationality. We then examine how that identity proved to be problematic for both Enlightenment writers and more recent theorists. Readings include Enlightenment texts, secondary historical literature, and critical analyses by Horkheimer and Adorno, Alasdair, MacIntyre, Derrida, Foucault, and Habermas.

S Hum 411 Ethics, Evil, Sexual Difference (also French Literature 434 and Comparative Literature 414) Spring. 3 credits. Limited to 17 students. T. Cope

The symbolic mutation that began in the 19th century to topple old regimes of power brought with it a mutation of the ethical field. The Good, which had been guided moral action, dropped from our practical horizons; henceforth no deed could be sanctioned in advance, externally, by any guarantee of its goodness. Many theorists have been cowed by this state of affairs into adopting a relativist stance on ethical questions. We will try to show why this position is not only insufficient, but unethical, how it remains blind to the real issue of evil whose insinuating rise over the last two centuries has been evidenced by modern racism. Focusing on a reading of Jacques Lacan's The Ethics of Psychoanalysis supplemented by philosophical and political texts (by Kant, Lefort, Laclau, Zizek, and others), we will attempt to show not simply what psychoanalysis adds to ethical thought but why modern ethics is unthinkable outside psychoanalysis. We will also try to determine why Lacan makes a woman, Antigone, the exemplar of ethical action and to suggest what might constitute an ethical feminism. Several films, screened outside seminar hours, will serve as reference points for some of our discussions.

S Hum 415 Praxis and Culture Spring. 4 credits. Limited to 17 students. J. Fajans

This seminar will explore the relations between social and cultural systems and the actors in those systems considered as cultural subjects. The focus will be on the activities and practices that produce both the actor and the context for action. We will explore Marx's concept of praxis, which he defines as material processes of action, the readings will consider both micro level constructs of cultural forms (such as linguistic forms, semiotic forms of activity, habitus) and macro constructs (such as myth, cosmology, ritual, and social structures, etc.). The course will move between theoretical approaches in anthropology, psychology, sociology, and philosophy.

S Hum 416 Emotion and the Self (also Philosophy 441) Spring. 4 credits. Limited to 17 students. K. Jones

Emotions tell us how the world seems to agents and reveal what matters to them. Emotional responses can thus inform us both about agents' values and about their self-conceptions. In order to address the connection between the self and emotion, we must first understand what emotions are. Equipped with a suitable theory of the emotions, we next explore whether emotions are socially constructed. If they are socially constructed to any significant degree, then they can be used as a window onto possible cross-cultural variation in conceptions of the self. Several theorists (e.g., Charles Taylor and Naomi Scheman) have thought that, even within a single social context, emotions have a role to play in self-constitution, so we turn next to their thesis. The final section of the course will be a detailed examination of those emotions that most centrally touch on agency, including shame, pride, agent-regret, guilt, and remorse. Most of our readings will be by analytic philosophers, but these will be supplemented with readings from anthropology and psychology.

S Hum 417 Digital Culture (also Theatre Arts 441) Spring. 3 credits. Limited to 17 students. D. Rodowick

This seminar will examine how digital technologies are transforming contemporary life. Topics for reading and discussion will include the transformation of discourse by hypermedia, simulation and virtual worlds, transformations of identity in on-line communities, the political economy of...
information and telecommunications, ethical issues of surveillance and data security, and new forms of political organization and cultural resistance. There will be weekly online discussions in addition to the regular seminar meetings. Our emphasis will be cultural analysis and criticism from a semiotic perspective; extensive computer literacy is not a prerequisite.

**S HUM 418 Print and 18th-Century Literary Culture (also English 414 and 616)**

Spring. 4 credits. Limited to 17 students. N. Saccarino. This course will investigate the relationship between literature and the historical conditions of its production by examining the effects of print technology and a commercial reading public on literary theory and practice in 18th-century England. Topics will include: copyright, genius, and the modern author as legal subject; authenticity, anonymity, forgery, and the self in print; the novel and narrative authority; art and aesthetic value. Works by Dryden, Swift, Pope, Defoe, Johnson, and some recent history and theory.

**S HUM 419 Suppressing Laughter in London and Dublin, c. 1680-1900 (also English 419 and 617)**

Spring. 4 credits. Limited to 17 students. S. Siegel. This seminar seeks to explain the intermittent efforts in London and in Dublin, c. 1680-1900, to forbid the performance of Comedy, to threaten "punsters" with catastrophe; to forbid the performance of Comedy; to threaten "punsters" with catastrophe; to forbid the performance of Comedy; to threaten "punsters" with catastrophe. Philosophical readings from ancient and modern sources (including Charles Taylor, Iris Murdoch, Ian Hacking, and Susan Bordo) will be supplemented by readings from other fields, including anthropology and psychology (e.g., from Clifford Geertz, Richard Shweder, Daniel Stern, and Louis Sass).

**S HUM 420 Alchemy and Abjection in Early Modern Europe (also Comparative Literature 401 and Romance Studies 406)**

Spring. 4 credits. Limited to 17 students. K. P. Long. Using the psychoanalytic works of Jung (The Psychology of Alchemy) and Kristeva's Powers of Horror as guides, this course will focus on the development of a divided subject in early modern alchemical texts such as Concerning the Nature of Things of Paracelsus, the Aureum velix (The Golden Fleece) of Salomon Trismosin, the Atlantis fugiens (Fleeing Atlantis) of Michael Maier, The Chymical Wedding of Christian Rosencreutz, among others. This course will provide an introduction to hermetic (alchemical) thought and explore the problem of gender distinction and its relationship to the gnostic divisions of spiritual/material, active/passive, and mind/body. We shall explore how these dualisms are played out and played with in the alchemical texts and how they carry over into the modern notions of subjectivity, based as they are on the subject/object distinction, which privileges the subject as agent. We shall also see how the alchemical emblem books in particular problematize these dualisms by "marrying" visual elements to their texts, in an attempt to embody abstract concepts. These works thus destabilize easy divisions between material and spiritual realms, and between subject and object as well. They persist as a subversive current in early modern culture, offering an alternative to the institutionalized divisions between gender and class. All texts will be in English translation.

**S HUM 421 Morality, Self, and Psychopathology (also Philosophy 446)**

Spring. 3 credits. Limited to 17 students. J. Whiting. Self-conceptions play important (perhaps "self-fulfilling") roles in self-constitution, so that selves may differ in ways that abstract philosophical theories tend to ignore. We will examine self-constitution, paying special attention not only to moral ideals (e.g., the Buddhist dissolution of self) but also to psychopathology, and even one's philosophical views. We will examine self-constitution, paying special attention not only to moral ideals (e.g., the Buddhist dissolution of self) but also to psychopathology, and even one's philosophical views. We will examine self-constitution, paying special attention not only to moral ideals (e.g., the Buddhist dissolution of self) but also to psychopathology, and even one's philosophical views. We will examine self-constitution, paying special attention not only to moral ideals (e.g., the Buddhist dissolution of self) but also to psychopathology, and even one's philosophical views. We will examine self-constitution, paying special attention not only to moral ideals (e.g., the Buddhist dissolution of self) but also to psychopathology, and even one's philosophical views.

**S HUM 422 Crimes of the Nation and Cinematic Mortification (also French Literature 421 and Theatre Arts 422)**

Spring. 3 credits. Limited to 17 students. N. Wood. This seminar will consider a range of films about Vichy and France's colonial past in the larger context of theoretical work which addresses memories of crimes committed in the name of the French Nation. Drawing upon recent historiography and theories of film spectatorship and of the performative dimension of commemorative practices, the seminar will analyze how such films enact the current crisis of national republican identity.

**S HUM 423 Visual Perception in the Art of the Theatre (also Theatre Arts 440 and 640)**

Spring. 4 credits. Prerequisite: Permission of the instructor. D. Wilcox. Using a broad range of material including semiotics, philosophy, cognitive psychology, art criticism, and phenomenology this course is designed to examine the concept of seeing theatre as it relates to language, images, memory, and perception.

**South Asia Program**


The South Asia Program coordinates research, teaching, and special campus events relating to the region stretching from Burma through India, Pakistan, Nepal, and Sri Lanka. The program faculty includes members from a variety of disciplines, including agricultural economics, agricultural engineering, anthropology, architecture, art, and writing, history, philosophy, comparative religion, ecology and systems, economics, English, government, history, history of art, human ecology, industrial and labor relations, international agriculture, linguistics, literature, rural sociology, and science, technology, and society. Undergraduates with a special interest in the region may major in Asian studies with a South Asia concentration, or complete a South Asia concentration with any other major. Graduate students may take a South Asia concentration in Asian Studies with a concentration in South Asia Languages offered are Bengali, Hindi, Nepali, Sinhala, Tamil, Urdu, Sanskrit, and Pali. Cornell is a class A member of the American Institute of Indian Studies (AIIS), and eligible as both graduate and undergraduate students for fellowships in India. For courses available in South Asian studies and details on the major, see the Department of Asian Studies listing in this volume.

Students who want further information on courses and research opportunities should direct questions to the program office, 170 Uris Hall.
Statistics Center
The Cornell Statistics Center coordinates a university-wide program in statistics and probability. Students interested in graduate study in probability and statistics should apply to the Field of Statistics or to one of the other graduate fields of study that offer related coursework. Courses in probability and statistics recommended for graduate students in the Field of Statistics can be found in the description of the Cornell Center for Statistics in the section "Interdisciplinary Centers, Programs, and Studies." Further information can be obtained from the director of the Statistics Center in Caldwell Hall.

Women's Studies Program

Introduction to the Program
Women's Studies is an interdisciplinary program that seeks to inscribe women's lives, culture, and history, in all their complex multiplicities. Transformative as well as additive, women's studies challenges us to re-examine the very notion of what we think we already know by providing an intellectual—and critical—feminist framework through which to view the many interconnections between gender, knowledge, and power. Thus, central to the curriculum in women's studies are such overarching notions as these:

(a) that definitions of gender—including those that privilege exclusive heterosexuality—are not natural or universal but are instead social constructions that vary across time and place, serve political ends, and have ideological underpinnings;

(b) that systems of gender inequality interact with other social inequalities, including those of class, race, ethnicity, sexual preference, and Western vs. non-Western cultures; and

(c) that even the most current knowledge derived from the humanities, social sciences, and natural sciences is not impartial, objective, or neutral as has traditionally been thought but instead emerges out of particular historical and political contexts.

Program Offerings
The Women's Studies Program offers an undergraduate major, an undergraduate concentration, and a graduate minor. Undergraduate students in the College of Arts and Sciences who wish to major in women's studies can apply directly to the program. Undergraduate students in other colleges at Cornell will need to work out special arrangements and should speak to the Director of Undergraduate Studies (DUS) in Women's Studies.

The Undergraduate Major
The questions posed by feminist inquiry cannot be answered by any single discipline or even from a simple combination of two or more disciplines. For that reason, the women's studies major provides students with a basic groundwork in the interdisciplinary field of women's studies and then requires each student to construct an advanced and individually tailored program of study on a topic, in a discipline, or in a combination of disciplines of special interest to the student alone.

Rather than specifying a particular sequence of required courses, the women's studies major provides students a starting point in women's studies, an active advisory structure to help them shape a curriculum, and an ongoing impetus to reflection about their entire program of undergraduate study.

In designing their major, students should keep in mind that there are not many graduate programs offering a degree in women's studies itself. Accordingly, undergraduates wishing to major in women's studies should talk at length with their faculty member about how to design a program of study that will best qualify them for entry into either a job or a postgraduate degree program when they leave Cornell. To give one example of what needs to be considered in designing a major: Undergraduates who might want to do graduate study within a discipline will need to develop a certain level of disciplinary specialization at the undergraduate level. This can be done either by supplementing the women's studies major with a carefully selected cluster of courses in that discipline or by pursuing a double major.

Requirements for a Women's Studies Major
1. Prerequisite courses. Before applying to the major, the student must complete any prerequisite courses but not as part of the women's studies major. Freshman writing courses would count both as a prerequisite and as one of the four required courses.

2. Required course work.
   a. A minimum of 36 credits in women's studies is required for the major. No course in which the student has earned less than a C- can count toward these 36 credits. Although there is no single women's studies course that is required of all students, every student majoring in women's studies must complete a program of study that is both graduated in difficulty and interdisciplinary in scope—a program, in other words, that reflects both the breadth and the depth of women's studies scholarship. This program of study must be developed in consulta­tion with the student's adviser in women's studies and must include advanced seminars at the 300 level or above.
   b. Students may count up to three courses outside women's studies toward the major if those courses are approved by the student's women's studies adviser as constituting a meaningful compo­nent of the student's women's studies curriculum. To facilitate the co­ordination of a women's studies major with other majors in the college, students may also count toward the major up to three women's studies courses that are simultaneously being counted toward a second major.

3. The Honors Program: To graduate with honors, the major in women's studies must complete a senior thesis under the supervision of a women's studies faculty member and defend that thesis orally before an honors committee. To be eligible for honors, students must have at least a cumulative grade point average of 3.0 in all coursework and a 3.3 average in all courses applying to their women's studies major. Students interested in the Honors Program should consult the Director of Undergraduate Studies (DUS) late in the spring semester of their junior year or very early in the fall semester of their senior year. For more information about the Honors Program, see WOMNS 400 and the "Guidelines For a Senior Honors Thesis" available in the Women's Studies Program office.

The Concentration
Undergraduate students in any college at Cornell can concentrate in Women's Studies in conjunction with a major defined elsewhere in the university. The concentration consists of four courses in Women's Studies, no more than two of which can come from a single discipline. Freshman writing seminars cannot be included within the required courses. Students wishing to concentrate in Women's Studies should see the DUS.

I. Freshman Writing Seminars
WOMNS 105 Feminine and Masculine Ideals in Japanese Culture (also Asian Studies 105)
Spring. 3 credits.
In its long history, Japanese culture has developed a large number of role models—the aristocrat, poet-priest, warrior, entertainer, "salary man," and "education mama"—and idealized them in its literature and art. Using these ideals as its subject matter, the seminar will give students practice in reading texts closely, analyzing ideas, and writing various types of papers. Through studying Japanese concepts of femininity and masculinity, the students will not only explore a new culture but will also gain new perspectives on their own cultures.

WOMNS 106 FWS: Women and Writing (also English 105)
Fall and spring. 3 credits.
What is a woman? How does she confront her personal experience? Does she play a special role in history, in our definition of society, or in our understanding of language and literature? This course will explore the relationship between women and writing. We will discuss writings by and about women, debate our attitudes toward feminism, and analyze the relevance of these questions to our own written work. Individual sections will emphasize different aspects of the relation between women and writing. Which section to choose would depend on your own interest in exploring how women appear in private or autobiographical writings, historical contexts, and/or literary works. Further information on specific sections is available in the freshman
Why is madness a compelling metaphor for the complexities of race, class, gender, and cultural conflict? How does one interpret the silences in a text? How is silence itself foregrounded in a literary text? This seminar will focus on these and other questions raised by the novel, poetry, and drama of black women writers from Africa, the United States, and the Caribbean including Bessie Head, Toni Morrison, Adrienne Kennedy, Opal Palmer Adisa, Tsitsi Dangarembga, Marlene Philip, and Jamaica Kincaid.

II. Courses

[WOMNS 206 Gender and Society (also Rural Sociology 206)]
Spring. 3 credits.
This course analyzes the evolution and diversity of socially constructed gender hierarchies, in the United States and Internationally. The maintenance of gender inequalities in societal institutions, such as the family, the workplace, politics, and religion, will be explored. A range of sociological theories and disciplinary perspectives are considered, including biological, psychological and psychoanalytic perspectives. Course objectives will be achieved through lectures, readings, films, class discussions, and personal experiences.

[WOMNS 210 Introduction to Feminist Theory]
This course introduces students to critical approaches in feminist scholarship to the cultural, socioeconomic, and political situation(s) of women. Particular attention will be paid to the conceptual challenges and dangers posed by attempts to study women without taking account of relations between race, class, and gender in ideological and social formations. Readings will draw on work in various disciplines and will include literary texts and visual images.

[WOMNS 214 Biological Basis of Sex Differences (also Biological Sciences 214)]
3 credits. Prerequisite: One year introductory biology. Limited to non-biology majors and freshman & sophomore biology majors. Offered alternate years. Next offered Fall 1996.
The structural and functional differences between the sexes are examined. Emphasis is placed on mechanisms of mammalian reproduction, where possible, special attention is given to studies of humans. Current evidence on the effects of gender on non-reproductive aspects of life (behavior, physical, and mental capabilities) is discussed. The course is intended to provide students with a basic knowledge of reproductive endocrinology and with a basis for objective evaluation of sex differences in relation to contemporary life.

[WOMNS 218 The Economics of Gender (also City and Regional Planning 218)]
Spring. 3 credits. Not offered 1995-96.
The emphasis in this course will be on the economic aspects of women and work. What are the consequences of women's concentration in reproductive work? What economic role does domestic work play within the larger economy? What are the consequences of occupational segregation by gender? Why is the wage gap between men and women not disappearing? What is the role of discrimination? What is the condition of women in other countries? Throughout the course we will examine different analytical frameworks and distinguish between feminist perspectives dealing with those questions.]
will focus especially on how each ethnic tradition uses the contested territories of American language and literature capable of marking the emergence of a contemporary American culture. Works by writers in these traditions will be studied as site-specific emphasis on the links between sexuality and race.

**WOMNS 263 Interpreting Melodrama and the Woman's Film (also English 263)**

Spring. 4 credits. Students must be free to attend regular screenings of films and videos. Lab fee $25.00. Enrollment reserved for Women's Studies and English majors. Limited to 20 students.

With some attention to melodrama's roots in nineteenth-century fiction and theatre and in twentieth-century women's fiction and popular Freudianism, we will work to define Hollywood's melodrama as both a genre and a way of viewing the world. Psychoanalytic and feminist analyses of melodrama will help us pose larger questions about gender and culture, about gendered spectatorship, about the role women play in the labor force, with a focus on theories of identity, the social-psychological processes given to biological perspectives, the course emphasizes the social-psychological processes.

**WOMNS 265 Ethnic Literature: Bridges and Boundaries (also English 264)**

3 credits. Not offered 1995–96. This course will serve as an introduction to ethnic and racial consciousness as it relates to the construction of identity, the relationship between women's and ethnic identities. The American language that came, as William Carlos Williams noted, "from the mouths of Polish bakers..." and so it has been shaped by the oral and written traditions of Native Americans, African Americans, Hispanic Americans, and Asian Americans whose literary production will be examined in this course. Works by writers in these traditions will be studied as sites marking the emergence of a contemporary American language and literature capable of representing the diverse and particular realities of a multicultural nation. This course will focus especially on how each ethnic tradition uses the contested territories of geography, language, gender and sexuality in texts that both refer to and imaginatively construct their own traditional contexts and connections. Discussion will focus on how each text makes connections and distinctions between individuals as well as within and among communities bound together by shared linguistic, geographical, spiritual, and cultural traditions, and the territorialization of bodies, especially women's bodies, as boundaries or bridges between races/ethnicities, in discursive constructions of ethnicity.

**WOMNS 269 Introduction to Feminist Political Thought (also Government 269)**

4 credits. Not offered 1995–96. This course will provide a general introduction to feminist political thought, surveying various current issues and methodologies. The course will combine analysis of women in western political thought and the relationship of feminism to the discipline of political science, readings by contemporary feminist theorists, and consideration of what theory can contribute to practical issues such as battering, pornography, prostitution, racism, sexuality, and sexual harassment.

**WOMNS 273 Women in American Society, Past and Present (also History 273)**

4 credits. Next offered spring 1997. A survey of women's experiences in America from the seventeenth-century to the present. Among the topics to be discussed are women's familial roles, the changing nature of household work, the women's rights movement, employment of women outside the home, the public sphere, women's work was relegated to the private sphere of the family. Recently this has changed as women seek employment outside the home. In this course we will examine women's positions and roles women play in the labor force, with a focus on more developed societies. Specific topics will include sex differences in pay and sex segregation in the labor force, theoretical explanations of gender to Marxist feminism, the relationship between women's paid and unpaid labor, and the role of the state and government policy.

**WOMNS 277 Social Construction of Gender (also Psychology 277)**

Fall, 1995. 3 credits. Limited to 400 students.

This course addresses the very broad question of how an individual's gender and sexuality are constructed. Although some attention is given to biological perspectives, the course emphasizes the role of social psychological processes by which the culture transforms male and female newborns into "masculine" and "feminine" adults. In addition to being quite applicable to the historical roots of present-day social configurations, this course examines conceptions of gender, the relationship between women's and ethnic identities. Among the topics to be discussed are women's familial roles, the changing nature of household work, the women's rights movement, employment of women outside the home, the public sphere, women's work was relegated to the private sphere of the family. Recently this has changed as women seek employment outside the home. In this course we will examine women's positions and roles women play in the labor force, with a focus on more developed societies. Specific topics will include sex differences in pay and sex segregation in the labor force, theoretical explanations of gender to Marxist feminism, the relationship between women's paid and unpaid labor, and the role of the state and government policy. Distinctions among ways that the arts, mass media, social and historical forces, and interpersonal relationships communicate gender will be considered.

**WOMNS 279 Lesbian Personality (also English 279)**

Fall. 3 credits. This course will offer a survey of literature and films by or about lesbians. We will examine how lesbian desire and identity are historically constructed, and how they have been understood and articulated. What does it mean to read as a lesbian? What are the various tropes and personae through which lesbian desire has been articulated? What has been the relationship of feminism to lesbianism? How has lesbian identity been inflected by homophobia, sexism and racism? We will begin with a look at early paradigms for lesbian desire such as romantic friendship and sexual inversion, then move on to an extensive examination of feminism and its relationship with lesbianism, and close with a discussion of desire and performativity. We will read fiction by Gertrude Stein, Radclyffe Hall, Havelock Ellis, Sigmund Freud, Nella Larsen, Adrienne Rich, Monique Witting, Alice Walker, Cherrie Moraga, Jeanette Winterson, and Jewelle Gomez, as well as films by Leontine Sagan, Sheila MaLaughlin, Monica Trueit, Ingrid Bergman, and Rainer Werner Fassbinder. Students will be expected to attend a weekly film screening in addition to seminars.

**WOMNS 281 Gender and Society in the Muslim Middle East (also Near Eastern Studies 281 and Religious Studies 281)**

Spring. 3 credits. Limited to 20 students. This course examines conceptions of gender in traditional Muslim society and the ways in which they have affected the experiences of Muslim women and men. Topics to be covered include the position of women in the religious law of Islam, female circumcision and the harem, sexuality, social hierarchies and family structure. Although attention will be given to gender issues in the contemporary Middle East, the course focuses on the historical roots of present-day social configurations.

**WOMNS 284 Gender and Communication (also Communications 284)**

Spring. 3 credits. Not open to freshmen. This course explores the construction of gender and personal, social, and economic implications of gender identity. Theories considered include history, social structures, personal relationships, nonverbal and mass communication. Distinctions among ways that the arts, mass media, social and historical forces, and interpersonal relationships communicate gender will be considered.

**WOMNS 294 Feminist Literary Criticism (also English 294)**

3 credits. Not offered 1995–96. In this course we will explore the history and contemporary inflections of feminist literary criticism and theory, with an emphasis on close readings of major or classic articles, essays, books, and controversies. We will start by reading Virginia Woolf's A Room of One's Own and look at feminist re-readings of Woolf. We will explore notions of a feminist literary tradition and questions of canonicity, along with tensions between feminist materialist and psychoanalytic readings. We will look at theories about the role of the body and desire in women's writing drawn from French feminist theory, and psychoanalytic feminist criticism. We will also consider questions involving ethnicity, including recent African American feminist criticism, and recent gay and lesbian feminist criticism. Texts will include (among others) essays by Judith
WOMNS 305 Emotion, Gender, and Culture (also Anthropology 305) Fall 4 credits
This course introduces students to the current anthropological perspective on the following topics: (1) cultural shaping of emotion and (2) acquisition and production of gender and sexuality. It is appropriate for students majoring in anthropology, psychology, cognitive studies, human development and family studies, and women’s studies.

WOMNS 307 African-American Women in Slavery and Freedom (also History 303 and Africana Studies 307) Fall 4 credits. Next offered spring 1997. This course thematically explores the history of African-American women from a sociopolitical perspective. Topics include the images and depictions of Black women, how Black women have engaged in political struggle, race relations, race progress vs. feminism, the relationship between racism and sexism, and Black women in family life.

WOMNS 321 Sex and Gender in Cross-Cultural Perspective (also Anthropology 321) Fall 4 credits.
An introduction to the study of sex roles cross-culturally and to anthropological theories of sex and gender. The course examines the relative positioning of the sexes in social, political, economic, ideological, cultural, and biological aspects of culture; we emphasize the diversity of gender and prospects for change around the world. In addition to lectures and films or videos, participants will work in small discussion sections (maximum enrollment of eight) to prepare several practical field exercises, short papers and critical assessments of other course materials.

WOMNS 341 Ethical Theory (also Philosophy 341) Spring 4 credits. Next offered spring 1997. Like much of contemporary feminist theory, feminist ethics began with the assumption that ethical theory was fully adequate to address feminist concerns. All that needed to be done was to take the resources of ethical theory and apply them to hitherto overlooked questions, such as abortion, affirmative action, justice in the family, and pornography. This project assumes, however, that the theories themselves are not gender biased. This claim has been challenged. In particular, it has been argued that traditional ethical theory overlooks the situatedness of agents and devalues emotions and relations to particular others. We will critically examine these claims and their challenge to ethical theories that take the principal moral concept to be the concept of “duty”. In addition, we will examine the view, argued for by Carol Gilligan, that women speak with a distinctive ethical voice—one of care, rather than justice. Gilligan’s work raises the problem of what feminist ethics is; any move from “feminine” to “feminist” must be treated with great suspicion. It turns out that a wide variety of projects are currently being pursued under the general heading of feminist ethics and we will attempt to enlarge our understanding of what feminist ethics is and might become.

WOMNS 345 Gender Inequality (also Sociology 345) 4 credits. Next offered 1998. This course is an introduction to the systematic study of gender inequality in contemporary society. While the issues we will examine are specific to the study of gender inequality, they are representative of more general concerns in the field of sociology, e.g., stratification, power, and conflict.

WOMNS 348 The Female Literary Tradition: Wollstonecraft to Woolf (also English 348) Fall 4 credits. A course designed to survey and investigate the notion of a “female literary tradition” in Britain and America from the late eighteenth century to the twentieth century. Among other things, we will ask what it means to consider women’s—or, more precisely, our genres—literature. As we ask these questions, we will question the premises of the course as we work out ways of reading and interpreting works written by women out of very different historical and political circumstances. Authors may include Mary Wollstonecraft, Hannah Foster, Alphra Behn, Jane Austen, Mary Shelley, Charlotte Brontë, Harriet Beecher Stowe, George Eliot, Willa Cather, Edith Wharton, Virginia Woolf, Jean Rhys, Louise Erdrich, and Toni Morrison.

WOMNS 353 Feminism: State and Public Policy (Practicum in Government 353) Spring. 4 credits. The course examines the aims and strategies of the feminist movement in the United States and the response of both society and the state to feminist claims. It is, thus, a course about women’s writing—in other words, we will question the premises of the course as we work out ways of reading and interpreting works written by women out of very different historical and political circumstances. Authors may include Mary Wollstonecraft, Hannah Foster, Alphra Behn, Jane Austen, Mary Shelley, Charlotte Brontë, Harriet Beecher Stowe, George Eliot, Willa Cather, Edith Wharton, Virginia Woolf, Jean Rhys, Louise Erdrich, and Toni Morrison.

WOMNS 355 Decadence (also English 355) Spring. 4 credits. "My existence is a scandal," Oscar Wilde once wrote, summing up in an epigram the effect of his carefully cultivated style of perversity and paradox. Through their valorization of aestheticism and all that is considered artificial, unnatural, or morbid, the so-called “decadent” writers of the late-nineteenth century sought to free the pleasures of beauty and sexual desire from their more conventional ethical moorings. Although we will focus on Oscar Wilde, we will also read works by Charles Baudelaire, Paul Verlaine, J.-K. Huysmans, Renée Vivien, Leopold von Sacher-Masoch, Walter Pater, A.C. Swinburne, and Lionel Johnson, as well as a few later writers such as Ronald Firbank and Djuna Barnes. We will also consider historical, theoretical, and early medical texts on sexuality. Because this is a course in lesbian and gay studies, we will focus primarily on the various ways that decadence became a powerful trope for the articulation of homosexuality and other proscribed sexual pleasures. Topics for discussion will include homophobia and sexual encoding, androgyny and sexual inversion, sodomy and satanism, lesbianism and vampirism, cultural and linguistic degeneration, hysteria and paranoia, masochism and mysticism, transvestism, sublimation, Catholicism and Hellenism, and dandyism and camp.

WOMNS 357 American Families in Historical Perspective (also History 359, American Studies 359 and Human Development and Family Studies 359) 3 credits. Prerequisite: Human Development and Family Studies 150 or one 200-level social science or history course. Students in endowed units must register for Women’s Studies 357 or History 359 or American Studies 359. Not offered 1995–96. An introduction to, and overview of, problems and issues in the study of 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 state of the field of family in past time will deal with changing cultural conceptions of sexuality, sex roles, generational relationships, stages of life, and life events. Students will be required to do a major research paper on the history of their family, covering at least two generations and demonstrating their ability to integrate life-course development theory, data drawn from the social sciences, and historical circumstances.

WOMNS 358 20th-Century Experimental Fiction by Women (also English 358) 4 credits. Not offered 1995–96. With only a few exceptions, the works of fiction that we associate with the two great avant-garde movements of the twentieth-century, modernism and postmodernism, were written by men. Despite this mean the women writers prefer traditional modes of narration or are uneasy with innovation or have some sort of innate or acculturated affinity with realism or naturalism? This seminar will examine the cultural contexts that may bias readers toward seeing what is genuinely new and exciting in works by female authors, as well as ways that the works themselves may or may not resemble works by acknowledged experimental writers who are more the difference that sexual differences may make. Writers include Virginia Woolf, H.D. (Hilda Doolittle), Djuna Barnes, Doris Lessing, Alice Walker, and Margaret Atwood.

WOMNS 382 Global Perspectives on Gender 4 credits. Not offered 1995–96. The course will examine how forms of gender inequality have been shaped by international forces and structured by differences in national histories. The class will be taught by a rotating set of two faculty members from different departments. Contingent on the particular faculty directing the course, the class will consider such issues as cross-cultural perspectives on gender, the history of work and family life in different societies; the gendered division of labor in local, national, and international economies; the impact of colonialism; the organized efforts of women to define gender relations; the role of the state in constructing an engendered economy and polity.
Alcott's pragmatism, passionless femininity, and between "sentimental" idealism and political ways in which these writers used their texts to and slave narratives. We will investigate the works of fiction, political/feminist manifestos will contrast a variety of nineteenth-century American women writers, we In this cross-cultural examination of nine­

history is desirable.

some prior knowledge of medieval European 

WOMNS 365 Directions in Feminist Theory (also Government 362) Spring. 4 credits.

This course is designed to explore critical debates in contemporary feminist theory with particular attention to the status of gender as an analytic and political category. We will investigate how different theoretical traditions and perspectives relate gender to structures of race, sexuality, and class.

WOMNS 368 Marriage and Sexuality in the Middle Ages (also History 368) # Spring. 4 credits.

Few topics generate heat so readily as gender relations and sexuality. Behind the current controversies lie decisions made in the first Christian centuries, and formed up in the course of the Middle Ages; these still affect all of us, believers and unbelievers alike. This course studies Western attempts to deal with the problem of sexuality up to about 1500. The class will first clarify the church's normative rules of law and theology. Armed with this framework, it will then turn to more specific topics, including homosexuality, prostitution, rape/abduction and sexuality in medieval legal is to be able to compare the ideal model with the reality, and thus to assess the product the medieval church passed on to Western culture and ourselves. No formal prerequisite, though some prior knowledge of medieval European history is desirable.

WOMNS 374 Nineteenth-Century American Women Writers (also English 374 and American Studies 374) # Fall. 4 credits.

In this cross-cultural examination of nine­

teenth-century American women writers, we will contrast a variety of nineteenth-century works of fiction, political/feminist manifestos and slave narratives. We will investigate the ways in which these writers used their texts to construct culturally valuable and authentic selves. We will also consider tensions between "sentimental" idealism and political pragmatism, passionless femininity, and autonomy. Readings will include Louisa May Alcott's Behind a Mask, Anna Julia Cooper's A Voice from the South, Frances Harper's Ida LeRoy, Harriet Beecher Stowe's The Minister's Wooing, and Harriet Wilson's Our Nig.

[WOMNS 377 Gender in Early Modern Europe (also History 377) # 4 credits. Enrollment is limited to 30. Not offered 1995-96.

An inquiry into how masculinity and femininity were defined in early modern Europe. Questions to be explored include: What purpose did gender distinctions serve in the particular society? To what extent were men and women expected to shape and redefine the meaning of their gender? How was their ability to do so affected by such events as the Reformation and the French Revolution? Readings include both primary and secondary sources.]

WOMNS 380 Gender, Ideology, and Culture (also Sociology 380) Spring. 4 credits.

This course will explore representations of women in popular culture, including images, narratives, and religious practices. We will examine the relationship between popular culture and ideology, and seek out how women "read" popular culture. The aim of the course is to enable students to think critically and analyze the effects of ideological representa­tions of difference on personal identity construction, status, and power relationships Readings are drawn mostly from sociology of culture and cultural studies; most texts deal with popular culture and gender in the 19th and 20th century United States.

[WOMNS 381 19th Century French Women Writers (also French Literature 381) # 4 credits. Course conducted in French. Not offered 1995-96.

While situating the works read within their specific historical and literary context, this course will attempt to address two sets of questions: 1) How does the inscription of literature as a Public Institution within a phallocentric cultural order affect women authors' status and writing strategies? 2) To what extent and at what levels does being a woman inform or shape the text produced? In what ways is literary writing concerned with sexual difference? Writers will include Mme de Sévigné, George Sand, M. Desbordes-Valmore, Flora Tristan, and Rachilde.]

WOMNS 384 Women and Unions (also Industrial & Labor Relations 384) Spring. 4 credits.

This course will explore women's participation in the U.S. labor movement in the nineteenth and twentieth centuries. The class will cover issues such as women's workers' relations with male-dominated union movements, the role of cross-class alliances of women in organizing women workers, interactions with radical parties and organizations, problems faced by women union leaders and activists, racial and ethnic differences in organizing, and the impact of societal stereotypes and expecta­tions.

WOMNS 400 Senior Honors Thesis Fall and spring. 2-4 credits. For Women's Studies seniors only. Permission of Women's Studies Program required. Student must carry a GPA of 3.0 in all subjects and a 3.3 in Women's Studies. Both of the form, the media, and the nature and extent of control between student and advisor, will depend on mutual agreement between the two. In one common scenario, the student will write an essay of approximately 50 pages in length, drafted and revised in a series of carefully planned stages over the course of two semesters, with an outline expected on approximately Sept. 15th and a draft of the final chapter on approximately November 15th. An "R" grade will be assigned at the end of the fall semester and a letter grade on completion of the project at the end of the spring semester.

[WOMNS 404 Women Artists (also History of Art 466) 4 credits. Prerequisite: Permission of instructor. Auditing not permitted. Next offered fall 1996. This seminar will be devoted to a study of the work of women artists from antiquity to the present. The works of the most important women artists from each period will be studied in relation to the changing roles of women in society.]

WOMNS 406 The Culture of Lives (also Anthropology 406) # Spring. 4 credits.

This seminar examines the insights provided by diverse personal narratives into both the particularities of individual lives and into the wider social and cultural forms within which those lives unfold. We look at the place of life histories in the historical development of anthropology as a discipline, in terms of both the theoretical and methodological concerns they raise. We focus upon the contemporary resurgence of interest in personal narratives as windows onto both the social or cultural construction of the person as well as heavily upon women's lives and their representations to contrast men's and women's accounts and to underscore the socio-cultural significance of women's narratives in anthropology.

[WOMNS 408 Gender Symbolism (also Anthropology 408) # 4 credits. Not offered 1995-96. This seminar looks at how cultural meaning is constructed about biological sex differences. We begin from the presumption that sex difference and gender are culturally defined as a system of categories and meanings interacting with people's cognitive, intellec­tual, and affective experience of their worlds. The seminar has two primary conceptual objectives: (1) to analyze the relations among gender symbols and (2) to explore the relations between these symbols and the social worlds of the people who believe in them.]

[WOMNS 413 Women Around Freud (also German Studies 413 and Comp Lit 412) Spring. 4 credits. Not offered 1995-96.

This course is designed: 1) to expose students to the lives and work of women intellectuals in turn-of-the-century and early twentieth­

century Austria and Germany who influenced and were influenced by Freud and psycho­analysis; 2) to consider the work of women intellectuals whose interests converged with theories diverged from psychoanalytic thinking; 3) to explore definitions of "intellec­tuals" and the status of women as intellectuals both at the beginning of Louise Andreas-Salome, Anna Freud, Helene Lange, Karen Horney, Sabina Spielrein, Jean Riviere, Michaela Klein, Rosa Mayreder, Grete Meisel-Hess, Hedwig Dohrn, and Ellen Key.]

[WOMNS 416 Person, Gender, and Song (also Anthropology 417) # 4 credits. Not offered 1995-96. At stake in the anthropological endeavor to represent others' worlds is not only our capacity for communion, but rather an
epistemological puzzle: how do we come to (systematic) knowledge of other realities? On the premises that we come not to know persons (directly), but among other things (through) their words, that words are contextually produced, that some contexts are more highly recognized than others, and that a common and powerful genre is song, this seminar will look at several cases of traditional song and its relation to personal realities, with specific attention to the following: communicating, evaluating, and remembering of gender identities.

[WOMNS 425] Gender Relations, Gender Ideologies, and Social Change (also Rural Sociology 425)
This course offers a comparative analysis of rural women's work in agriculture, domestic and household production, and forms of wage work and self-employment in both Third World and industrialized countries. Drawing on feminist and sociological theory and methods, the course examines gender ideologies, work-family linkages, responses to technological innovation, the transformation of the labor process, and the international division of labor as processes that restructure gender relations and challenge existing proscriptive norms of women's behavior.

[WOMNS 426] Undergraduate Seminar in Early American History (also History 426)
Spring. 4 credits. Permission of instructor required. Preference given to history and women's studies majors.

[WOMNS 431] Scenes of Female Enlightenment (also English 431)
In this course we will explore the ways in which Enlightenment thinking about women and women's own concern with their rights and education during the late 18th Century intersects with an inquiry into femininity itself. How did the focus on sentimentality limit, shift, or enable, emancipatory feminist discourse? Starting with Rousseau's Nouvelle Eloise and Emile, we will trace the influence of Rousseau on a variety of 18th century sentimental and educational writers, including Saint-Pierre (Paul and Virginia), Edgeworth (Belinda), and Wollstonecraft (Vindication of the Rights of Women). If available, we will also read selections from women educators of the period, such as Mrs. Macaulay and Hannah More. Most novels of feminist protest by Wollstonecraft (The Wrongs of Woman) and Mary Hays (Memoirs of Emma Courtenay), we will explore other mothers of female tradition in fiction, women writers' conceptions of themselves and their work, and their social and cultural situation. We will look at letters, diaries, and biographies (including Gaskell's Life of Charlotte Bronte) as well as several novels.

[WOMNS 450/650] The Lenses of Gender (also Psychology 450/650)
4 credits. Permission of instructor required. Limited to 18 seniors and graduate students. No preregistration; interested students should attend the first class. Graduate students sign up for Women's Studies/Psychology 650. Not offered 1995-96.
This seminar examines the ideological, institutional, and psychological mechanisms that are responsible for the social production of male power in Western—and especially American—culture. It is interdisciplinary, covering material from biology, history, anthropology, law, sociology, psychology, psychiatry, philosophy, and feminist theory. Part one analyzes three important organizing principles or "cultural lenses" that have come to be embedded in the social institutions and cultural discourses of Western culture: (a) biological essentialism; (b) androcentrism; (c) gender polarization (including the stigmatizing of homosexuality). Part two analyzes how the individuals living within the context of these lenses are transformed from beings and objects of female newborns to being "masculine" and "feminine" adults—how, in other words, the culture's gender lenses are subtly transferred from the practices of the culture to the psyche of the individual. Part three considers possibilities for social and personal change.

[WOMNS 451] Women in Italian Renaissance Art (also Art History 450)
4 credits. Prerequisite: permission of instructor. Not offered 1995-96.
This seminar examines representations of the Madonna and Child from the fourteenth and fifteenth centuries, the narrative scenes painted on marriage chests and other domestic furniture, biblical and historical heroines such as Judith and Didraca, portraits of patrician women and courtesans, and violence to women in a political context. It will investigate the contemporary ideas about motherhood, beauty, sexuality, social presentation, and gender roles in society that inform these representations. We will discuss the existing critical frameworks for interpreting them in feminist art history and theory (particularly in Renaissance studies). We will be concerned especially with how visual images are encoded with meaning, what kind of relationship can be established with their historical context, and how they convey social constructs and ideology.

[WOMNS 455/655] Sexuality, Society, and the State in the Near East (also History 437/657 and Near Eastern Studies 455/657)
4 credits. Prerequisite: permission of instructor required. Limited to 15 students. Not offered 1995-96.
A seminar focusing on the ways in which social practice and the needs of the state have interacted to shape norms of sexual behavior and categories of gender and sexual identity. Topics we will examine include sexuality and gender as components of the state's attempts to define and control sexuality;
and the role of sexuality and gender roles in current political and social debates in the Near East. Special attention will be paid to the role of the legal process in mediating the contending forces of the state and society."

**WOMNS 459 Education in Africa and the Diaspora (also Africana 459)** 4 credits. Fall. This course deals with theories and concepts of planned change for social development and their application to educational innovations geared towards promoting equal opportunity based on gender, race, and class in Africa and the African Diaspora. The first part of the course will be concerned with the stages of innovations from their inception to their implementation, resistance, diffusion, and impact of different social categories. The second part of the course will deal with concrete cases of educational innovations such as the creation of educational institutions and change in curricular development and medium of instruction. Historical and contemporary cases of educational innovations will be presented and analyzed. The case studies include the development of Africana Studies as a discipline, the creation and expansion of historically black institutions such as Lincoln University in Pennsylvania, Tuskegee Institute in Alabama, Spelman College in Georgia, and the Westside Preparatory School in Chicago. The African Cases to be studied include education for self-reliance in Tanzania, African languages as a medium of instruction in Nigeria and Mali, and television as a medium of instruction in Côte d’Ivoire. Gender will be a main focus in the analysis of the agents and beneficiaries of the innovations.

**WOMNS 463 The Politics of Contemporary Feminist Theory (also Government 463)** 4 credits. Prerequisite: GOVT 369/WOMNS 269 or permission of instructor. Next offered spring 1997.

For years the women’s movement based its claim to equality on the assertion that men and women are the same. Recently, however, feminist theorists have argued that there are deep, fundamental differences between the sexes: for instance, do women and men view morality differently? What effect does reproduction have on female consciousness? Does women’s work produce a particular epistemology, or “way of knowing”? How do gender, race, class, sexual orientation, etc., influence each other? Drawing on works from political science, psychology, sociology, literary criticism, and philosophy, we will examine a variety of contemporary methods and approaches to feminism, paying particular attention to the issue of “difference” and how claims of difference affect women’s claims to equality. In the process, we will examine the “politics” of feminist theory, and what feminism has to offer political science as a discipline.

**WOMNS 464 Gender and Politics in the Roman World (also Classics 463 and History 463)** 4 credits. Not offered 1995–96.

An undergraduate seminar examining the relationship between gender and politics in the late Republic and the early Empire. Among the questions this course will address are: was politics the exclusive domain of men in Roman society (as is generally assumed) or does a broader definition of politics and an understanding of the various forms that political activity in ancient Rome might take allow a place for women in Roman political life? What role does gender have in Roman political discourse and ideology? Why do issues such as family, marriage, and sexuality become subjects of political debate and legislation?

**WOMNS 466 Feminism and Gender Discrimination (also Government 466 and Law 648)** 4 credits. Next offered in fall ’96 or spring ’97.

This course will introduce students to the major schools of feminist legal theory, including equality theory, difference theory, dominance theory, and anti-essentialism. It will then use these theories as a framework for examining several areas in which the law has attempted to address gender-specific injuries. These will include the workplace (sexual harassment, regulation of fertility, work/family conflict), the family (abortion, surrogacy), and violence against women (rape, spousal abuse, pornography). The course will emphasize analysis and critique of present political and legal responses and formulation of alternative responses. Some previous exposure to legal materials (case law, statutes) is useful but not required.


This seminar will consider six major novels—Mrs. Dalloway, To the Lighthouse, Orlando, The Waves, The Ariel (or Woolf’s unfinished novel/essay The Pargiters), and Between the Acts—as well as A Room of One’s Own, Three Guineas, and a selection of the shorter essays. We will also look at relevant materials from the diaries and occasionally from the letters. Class members will give at least two presentations over the course of the semester and will be expected to participate regularly in discussions. Regular short written assignments, two major papers (10–15 pages).

**WOMNS 471 American Indian Women’s Literature (also English 471)** Spring. 4 credits. Not offered 1995–96.

From Pocahontas to Shakes a Fist in Dances With Wolves, depictions of American Indian women rarely present their points of view. Through a variety of genres—short fiction, autobiographies, poetry, and oral histories—we will listen to the voices of American Indian women; we will listen for their aesthetic and cultural values, as those values reflect Indian history in general, tribal histories and values, and their life stories. We will begin with works from or about nineteenth century life and proceed to an examination of works by such well-known Indigenous women writers as Beth Brant, Louise Erdrich, Leslie Silko, and Joy Harjo. We will explore questions such as: How does the image of Pocahontas affect the representation of other Indian women? Do American Indian women activists, and have they written of their lives? What is the relationship between the woman in myths and legends and women in the real world? The student’s grade will be based on two formal papers and a number of informal writing assignments and reports.


Black women, while challenging feminism to acknowledge and explore difference among women, have also created a literature in which differences among black women, particularly differences of color and class, are meticulously observed and critically articulated. As collaborators in the creation of Afro-American culture, black women have also written perceptively about the precise inflections of gender that make differences in the experience of black and white men. This course will focus on textual representations of color, class, and cultural differences within Afro-American communities, especially as these differences influence constructions of female identity in the texts of black women writers, including Nella Larsen, Gwendolyn Brooks, Toni Morrison, Alice Walker, Toni Cade Bambara, Paule Marshall, Adrienne Kennedy, Gayl Jones, Terry McMillan, and Andrea Lee.

**WOMNS 475 Studies in the Twentieth Century (also English 475)** Fall. 4 credits. Topic for Fall 1995: Gender and War in the Twentieth Century

In the twentieth century, justifications of or oppositions to war are often represented in highly gendered language, with whole nations coded as masculine or feminine (or some indeterminate region between the two poles) depending on their attitude toward aggression. In addition, the situation of war can sharpen or fuzz existing gender boundaries applied to individuals, for instance requiring revised definitions of femininity when women enter the workplace in large numbers or creating new distinctions between “real” and “effeminate” men based on willingness to fight.

This seminar will examine diplomatic, journalistic, theoretical and imaginative writing, as well as political cartoons and films, dealing with three major wars in the twentieth century: World War I, World War II and the Vietnam War—the last in its encircling Cold War context. Students will lead one class discussion and write two 10-12 page papers.


This course will examine both the theoretical literatures and case studies on the history of gender relations in Africa during the precolonial and early colonial period. The course will be divided into two parts. In the first section, we will explore gender relations before the advent of colonialism; in the second we will focus on the early colonial period. In both sections students will read and analyze a number of theoretical perspectives and case studies in order to participate in the debates that are of current concern to historians. Among the themes to be explored are: what was the nature of gender relations in precolonial Africa, what structural features affected the way in which gender relations were sustained within particular societies; how were these relations affected by the entrance of Islam, the slave trade and the changes that took place before the late 19th century in the political, religious and social structures of particular African societies; how did colonialism affect gender relations in particular African societies; what factors influenced the nature and extent of that impact.
WOMNS 478 Family and Society in Africa (also Africana 478) 4 credits. Fall. The family as a social institution is structured according to socioeconomic, historical, political, and cultural specificities. In this course, the topics to be discussed will include the concepts of nuclear and extended family, the place and role of different age-groups and generations in the family, marriage and related issues, such as dowry, divorce, parenthood, child-rearing, sex roles, and class differences. The course will also deal with the impact of industrialization and westernization on the structure of the family in Third World countries. Examples will be drawn from urban and rural communities in industrial/ western and agrarian/non-western societies.

WOMNS 479 Women and Gender Issues in Africa (also Africana 479) Spring. Seminar limited to 20 students. There are two contrasting views of the status and role of women in Africa. One view portrays African women as dominated and exploited by men. According to another view, women have a favorable social position in Africa indigenous ideologies consider women to be the foundation of society, they are economically active and independent and they have an identity independent of men. In this seminar, we will discuss the status and role of women in Africa historically as well as in the contemporary period. Among the topics to be covered are: women in non-westernized/precolonial societies; the impact of colonial policies on the status of women; gender and access to schooling; women's participation in the economy and politics; the attitudes of African women towards feminism; and the NGO and United Nations Nairobi Conferences on women.

WOMNS 481 Latin American Women Writers (also Spanish 482 and Comparative Literature 412) 4 credits. Taught in English. Fall. Fall. This course will provide a sampler of novels and short stories by and about Latin American women. We will look at the question of self-construction and issues such as the social and political concerns involved in a specifically Latin American feminine identity. All works will be read in translation (Romance Studies students should consult with their instructors about the material). Authors may include writers like Luisa Valenzuela (Argentina) and Rigoberta Menchú (Guatemala), Helena Parente Cunha and Clarice Lispector (Brazil), Helena Maria Viamontes and Gloria Anzaldúa (U.S.A.), and Simone Schwarz-Bart (Guadalajara.)

WOMNS 490 English Honors Seminar: Mary Wollstonecraft and Mary Shelly (also English 491) 4 credits. Prerequisite: Permission of instructor. This is an English Honors Seminar for English and Women's Studies Majors. Not offered 1995-96. In this seminar we will focus on the writings and the autobiographical constructions of two famous female writers and philosophers of the 18th and 19th centuries. We will read Mary Wollstonecraft's major writings of the 1780s and 1790s, beginning with her novel, Mary, and Thoughts on the Education of Daughters, before taking up her Vindication of the Rights of Men and the feminist Vindication of the Rights of Woman. We will also read her political writings about the French Revolution, her travel book, Letters written during a short residence in Sweden, Norway, and Denmark, and her unfinished novel, The Wrongs of Woman (also Spanish 492 and Comparative Literature 412). We will also read some of her later novels, including Valperga, The Last Man, and Perkin Warbeck, as well as her incest novel, Mathilda, along with selections from her Letters and Journals. Alongside the primary texts, the seminar will include readings that situate both Mary Wollstonecraft and Mary Shelley in relation to feminist theory and criticism as well as the Romantic movement. You will be expected to contribute an oral report, short papers, and final longer paper.]

WOMNS 491 Women's Studies Seminar (also English 491) Fall. Fall. Seminar limited to 17 people. Topic for 1995: Wharton, Jeved, and Cather. An examination of the major novels and stories of Edith Wharton, Sarah Orne Jeved, and Willa Cather. Focus will be on close analysis of works such as The House of Mirth. The Custom of the Country, and The Age of Innocence (Wharton) and The Country of the Pointed Fins (Jeved), and The Song of the Lark. My Antonia, A Lost Lady, and The Professor's House (Cather). Topics may include: "regionalism" and realism; women and literary professionalism in America 1870-1930; representations of speech communities; gender and sexuality; styles of taletelling; ghost stories and the haunting of a vanished past; the changing reputation of these writers and the reasons for their current high standing; literary interpretation and film adaptation. Some attention will be given to a range of critical approaches (including feminist, deconstructive, linguistic, and biographical), and to methods of research, uses of evidence, and preparation for the writing of an honors essay.

WOMNS 492 George Eliot (also English 491) Fall. Fall. Not offered 1995-96. We will read several of Eliot's major novels, from Adam Bede to Daniel Deronda, along with essays and letters, and try to gain as full a sense as possible of the works, the career, and the literary, intellectual, social, and cultural situation of the foremost Victorian woman novelist.

WOMNS 493 French Feminisms (also French 493) Fall. Fall. Not offered 1995-96. This course will examine the political, theoretical, and literary concerns of contemporary French writers who have addressed "la question de la femme/la question du feminin." Readings will include representative texts by Simone de Beauvoir, Monique Wittig, Julia Kristeva, Jacques Lacan, Luce Irigaray, Jacques Derrida, and Hélène Cixous. Taught in English.

WOMNS 499 Directed Study Fall or spring. Variable credit. Prerequisites: one course in women's studies and permission of a faculty member of the Women's Studies Program Board.

WOMNS 530 Womanist Writing in Africa and the Caribbean (also Africana 530) Fall. 4 credits. Not offered 1995-96. Theoretical essays on the nature, relevance, and articulation of womanist thought from African and Caribbean writers will complement literary texts. Gender issues, as manifested both at home and in migrant situations abroad, will be examined in texts by such writers as Sistren, Conde, Dangarembga, Aido, Warner-Vieyer, Ba, Emecheta, Kincaid, and W. Mandela. (Francophone works may be read in the original by individuals who so desire.)

WOMNS 594 Feminist Theory and the History of Art (also History of Art 594) Spring. 4 credits. Permission of instructor required. Seminar participants will examine the impact of feminist theory on art historical practice. Based on critical analysis of texts from the early 1970s to the present, we will consider the range of methods employed by feminists in the field: the political, theoretical, and discursive traditions to which the methods belong (liberal feminist, radical feminist, Marxist, semiotic, psychoanalytic, traditional art histories); and the interpretative problems they present in light of social theory and the politics of gender in the mid '90s.

WOMNS 600 Special Topics in Feminist Theory: An Interdisciplinary Graduate Course in Women's Studies (also French Literature 600) Fall. Fall. 4 credits. Not offered 1995-96. Seminar participants will examine the impact of feminist theory on art historical practice. Based on critical analysis of texts from the early 1970s to the present, we will consider the range of methods employed by feminists in the field: the political, theoretical, and discursive traditions to which the methods belong (liberal feminist, radical feminist, Marxist, semiotic, psychoanalytic, traditional art histories); and the interpretative problems they present in light of social theory and the politics of gender in the mid '90s.

WOMNS 608 African-American Women (also History 608) 4 credits. Not offered 1995-96. This seminar focuses on nineteenth-century African-American women in the United States and the Caribbean. Emphasis will be on interpretive examination of black women within a gender network, in the black community, and in the larger society. The course format is topical and includes abolition, women's rights, slavery, sexuality, education, and race uplift. Course requirements are (1) attendance and active participation and (2) completion of a 25-30 page paper based on primary research on some aspect of the history of nineteenth-century African American women.]
SPECIAL PROGRAMS AND INTERDISCIPLINARY STUDIES 531

[WOMNS 613 The Political Economy of Gender and Work (also City and Regional Planning 613)]

This course focuses on different approaches to the analysis of gender and work combining economic and feminist theory. Topics include: the significance of economic rationality and the rhetoric of economies from a feminist perspective, household theory, gender and the labor market, wage differentials, discrimination, labor market policies, gender and technology, economic restructuring and women's work, family and reproductive policies. The empirical material in the course concentrates on the U.S., but not exclusively, on the United States.

[WOMNS 614 Gender and International Development (also City and Regional Planning 614)]
Fall. 3 credits.

This course has four main objectives. First, to provide an overview of the location of women in processes of development and to understand the centrality of gender in each case. Second, to examine theoretical and conceptual frameworks for the analysis, including an understanding of gender divisions and their interaction with other forms of inequality such as class, race, and ethnicity. Third, to reflect upon the linkages between the global economy and the gendered macro and micro processes of development. Fourth, to provide a basis for research, practical action, and policy formulation and for evaluating directions and strategies for social change.

[WOMNS 618 Feminist Jurisprudence (also Government 618 and Law 618)]
Spring. 4 credits.

This course will focus on feminist (legal) theory through the lens of a current controversy: that between dominance feminists and feminist critics who believe that dominance theory deserves women by misrepresented their sexuality or their agency. After a close reading of works by McCann and Dworkin, we will study the “sex radical” critique from the sex wars period of the early eighties. We will then look at several strands of an emerging and developing theory, including those influenced by poststructuralism, Black feminism, and the study of women’s narratives. We will conclude by asking what those critiques mean for legal initiatives in areas such as rape, surrogacy, spousal abuse, sexual harassment, and pornography.

[WOMNS 621 Lesbian, Gay, and Bi-sexual Studies]
Fall. 4 credits. Not offered 1995–96.

The purpose of this seminar is two-fold: (1) to explore recent work in the field of lesbian and gay studies emphasizing on cultural theory, and (2) to provide graduate students with the opportunity to pursue their individual research projects in a collaborative setting. The first part of the semester will be devoted to a discussion of critical debates and texts in this emerging field, and the second half to students' presentations of their work.

[WOMNS 626 Graduate Seminar in the History of American Women (also History 626)]
4 credits. Limited to graduate students.


A reading and research seminar intended for graduate students. Major works in American women's history will be carefully scrutinized, and each student will prepare a lengthy research paper.

[WOMNS 631 Gender and Culture (also Anthropology 621)]
Fall. 4 credits. Open to graduate students only.

Extended consideration of the anthropological issues surrounding sex and gender introduced in ANTHRO/WOMNS 321. The discussion seminar portion of this course will emphasize contemporary theories of gender within anthropology and build specifically toward the formulation of important research problems in the field.

[WOMNS 632 Women Writers in the Middle Ages (also English 633)]

This course will study women writers of the Middle Ages, while examining some of the methodological—medieval and modern—for assessing these women's works and lives. The first week will be spent reading Marie de France, a selection of poems "praising" and "blaming" women and marriage, surveying medieval "theories about femininity," including both didactic and erudite varieties—and putting these selected modern essays. The balance of the course will concentrate on the works and contexts of women in the later Middle Ages, especially Margery Kempe, Julian of Norwich, Catherine of Siena, and Christine of Pisan, interlacing study of these with some excerpts from male writers in the same general traditions. Study of the later writers will include emphasizing the ways that the women writers interacted with their male intellectual peers and with their literary, religious, and philosophical traditions; we will seek to determine how these living and intellectual contexts the knowledge and authority and vision these women developed. Time permitting, some women writers of the sixteenth century may be included.

[WOMNS 636 Comparative History of Women and Work (also Industrial and Labor Relations 636)]
Fall. 4 credits.

This seminar will explore the similarities and differences among different cultures' assumptions about the work of women as well as women's experiences in varying work circumstances throughout history. Comparative examples will be taken from the United States, Europe, and the Third World.

[WOMNS 639 The Feminine Symbolic (also Anthropology 639)]
Spring. 4 credits.

A number of French and British feminists have constructed challenges to Lacan's reading of Freud in regard to the Feminine Symbolic as the 'symbolism of lacking a Phallus.' This seminar will address this literature from an anthropological perspective by comparing the Feminine Symbolic in diverse cultural constructions of sexual difference, desire, the body, identity, power and the subject.

[WOMNS 654 Queer Theory (also English 654)]
Spring. 4 credits.

The only thing better than having sex is theorizing about it. In this seminar we will provide us with a more sophisticated language with which to examine lesbian and gay issues in literature and culture, this course will offer an introduction to the most influential trends in queer theory. The first few weeks of the course will focus on the psychoanalytic discourse of homosexuality, as it was conceived by Freud and revised and redeployed by lesbian and gay theorists. The second part of the course will concentrate on Foucault and various applications of social constructionism to lesbian and gay theory and feminism. In the final few weeks, we will discuss recent debates about sexuality and identity politics. We will draw on works and essays by Bersani, Butler, Crip, de Lauretis, Deleuze, Freud, Foucault, Fuss, Halperin, Hocquenghem, Kincaid, Moraga, Rubin, Sedgwick, Watney, and Wittig, among others.

[WOMNS 660 Gender in Nineteenth-Century America (also English 661)]

A study of the relation between historical experience and literary texts. We will examine from the perspectives of both historical and literary analysis the rise of women writers, the novel's preoccupation with conflicts between men and women, the cultural uses of feminism and antifeminism, and the impact of the new woman. Bringing traditional literary texts—novels and poetry—into dialogue with contemporary texts like journalism, political treatise, social reform manifestos, and etiquette books, we will draw on the methods and theories of cultural history and literary criticism to ask how gender relations and the practices of politics bear on the plots, discourses, and images of literary texts. A tentative reading list would include Susannah Rowson's Charlotte Temple, Lydia Maria Child's The Mother's Book, Catherine Beecher's Domesticity, Nathaniel Hawthorne's The Blithedale Romance, Harriet Beecher Stowe's Uncle Tom's Cabin, Herman Melville's Pierre, poems by Emily Dickinson and Walt Whitman.

[WOMNS 670 Feminist Political Theory (Graduate Seminar) (also Government 671)]
Spring. 4 credits. Open to undergraduates who have taken GOVT 463 or other courses in feminist theory and who have the permission of the instructor. Next offered fall 1995.

This graduate seminar will examine contemporary feminist theory from the perspective of political theory. We will study the work of feminist theorists who work specifically within the discipline of political science, as well as the specifically political dimensions of work not generally considered political theory. Though particular readings and topics will change from year to year in response to the most recent literature, in general the course will focus on questions of epistemology and methodology as a way to explore a variety of issues of relevance to feminism as an academic, intellectual, and political enterprise.

[WOMNS 671 Feminist Methods (also Rural Sociology 771)]

Employing a sociology of knowledge perspective and comparative approach within the social sciences, this course will review and analyze contemporary and methodological perspectives in the feminist epistemological critique of sociological methods. The course will begin by identifying what constitutes mainstream explanations within the social sciences, introduce early feminist challenges to androcentric paradigms, move to examine the historical and postmodern challenge, and then outline issues critical to "doing fieldwork." In the latter section, we will examine studies that address issues of class, race, ethnicity, and constructions of otherness.
We will consider, by means of essays, what are some of the particular problems women, in order to explore not only the theoretical and empirical perspectives in which feminist theory and policy are integrally related to one another. In 1994, focusing on such issues as domestic violence, pornography, welfare, and the military, we will approach each of these issues from a variety of theoretical perspectives. In addition, they will write a final paper in which they develop the theoretical underpinnings of existing policy as well as the political and theoretical implications of various feminist prescriptions. 

**WOMNS 680 Twentieth-Century Women’s Poetry (also English 680)**

Spring. 4 credits. Not offered 1995-96. This course will be a reading and discussion seminar on poems of the twentieth century which are by women, in order to explore not only the poetry but the stance of the poet in regard to gender. For example: Elizabeth Bishop did not wish to be regarded as a “Woman Poet.” What are some of the particular problems encountered by women poets of this century? We will consider, by means of essays, biographical, and critical works, the processes—mental, emotional, social, and intellectual—by which these women attempted to shape a poetic esthetic. 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 in which at least one of the readings is related either to aspects of technique or esthetic philosophy. Suggested readings for the course include selections from the writings of such poets as Millay, H.D., Brooke, Moore, Rich, Plath, Levertov, or others to be decided on among seminar participants.

**WOMNS 690 Feminist Criticism (also German Studies 690)**

4 credits. Open to qualified undergraduates with permission of instructor. Reading knowledge of German recommended but not required. Not offered 1995-96. This course is designed to explore developments in feminist literary theory with particular attention to the field of German literature. We will consider competing critical strategies and their political implications by working through different readings of specific literary texts and by raising questions about the implications for feminism of competing critical strategies in the general field of literary theory; the relations between feminism and established critical schools; the tension in German Feminist between critical attention to the “male canon” and the construction of a female literary tradition; the impact on German feminism’s of their translations of French and American work; the impact and treatment of the Nazi period; the effects of the East-West divide on development in Germany; the impact on feminist literature and criticism of Third World women in Germany; and approaches to Germany to imperialism and racism.
Tertian, Yervant, Ph.D., Indiana U.
James A. Weeks Professor of Physical Sciences, Astronomy/NAI
Teskey, Gordon L., Ph.D., U. of Toronto. Canada, Prof., English
Tesakovsky, Serb, A., Ph.D. California Inst. of Technology. Prof., Physics/LNS/ Astronomy
Thorbecke, Erik, Ph.D., U. of California at Berkeley. H. Edward Babcock Professor of Economics and Food Economics, Nutritional Sciences/Economics
Thorne, Robert E., Ph.D., U. of Illinois. Assoc. Prof., Physics/LASSP*
Tierney, Brian, Ph.D., Pembroke College of Cambridge U. (England). Bryce and Edith M. Bowman Professor in Humanistic Studies Emeritus, History
Tigner, Maury, Ph.D., Cornell U. Hans Bethe Prof. of Physics, Emeritus, Physics/LNS]
Tittler, Jonathan P., Ph.D., Cornell U. Prof., Romance Studies
Toueg, Sam, Ph.D., Princeton. Prof., Computer Science
Travers, William B., Ph.D., Princeton U. Prof., Geology/Geosciences
Trefethen, Lloyd N., Ph.D., Stanford U. Prof., Computer Science
Turcotte, Donald L., Ph.D., California Inst. of Technology. Maxwell M. Upson Professor of Engineering, Geological Sciences/ INSTOC®
Turner, James E., Ph.D., Union Graduate School at Antioch College. Assoc. Prof., Africana Studies and Research Center
Tye, Sze-hoi Henry, Ph.D., Massachusetts Inst. of Technology. Prof., Physics/LNS]
Uphoff, Norman T., Ph.D., U. of California at Berkeley. Prof., Government
Usner, Daniel H., Jr., Ph.D., Duke U. Assoc. Prof., History
Vaneck, Jaroslav, Ph.D., Massachusetts Inst. of Technology. Carl Marks Professor of International Studies, Economics
Van Coetsem, Frans, Ph.D. U. of Leuven (Belgium). Prof. Emeritus, Modern Languages and Linguistics
Van Loan, Charles R., Ph.D. U. of Michigan. Prof., Computer Science
Van Steen, Gonda, M.A., Princeton U. Asst. Prof., Music
Vargas, James, Ph.D., Stanford U. Asst. Prof., Computer Science
Veraciro, Marcelo, Ph.D., U. of Minnesota. Asst. Prof., Economics
Weverka, Joseph F., Ph.D., Harvard U. Prof., Astronomy/CRSR®
Vogelsang, Tim, Ph.D., Princeton U. Asst. Prof. Economics
Vogtmann, Karen L., Ph.D., University of California at Berkeley. Prof., Mathematics
Volman, Thomas P., Ph.D., U. of Chicago. Assoc. Prof., Archaeology
vonEicken, Thorsten, Ph.D., U. of California at Berkeley. Asst. Prof., Computer Science
Wahlbin, Lars B., Ph.D., U. of Göteborg (Sweden). Prof., Mathematics
Waite, Geoffrey C. W., Ph.D., Princeton U. Assoc. Prof., German Literature
Walker, Henry A., Ph.D., Stanford U. Prof., Sociology
Wan, Henry Y., Jr., Ph.D., Massachusetts Inst. of Technology. Prof., Economics
Washington, Margaret, Ph.D., U. of California at Davis. Assoc. Prof., History
Wasserman, Ira M., Ph.D., Harvard U. Prof., Astronomy/CRSR®
Waugh, Linda R., Ph.D., Indiana U. Prof., Modern Languages and Linguistics/ Comparative Literature/Romance Studies
Webster, James, Ph.D., Princeton U. Prof., Music
Weiss, John H., Ph.D., Harvard U. Assoc. Prof., History
West, James E., Ph.D., Louisiana State U. Prof., Mathematics
Wetherbee, Winthrop, Ph.D., U. of California at Berkeley. Avalon Professor of English and Medieval Studies, English/Medieval Studies/Comparative Literature
White, William M., Ph.D., U. of Rhode Island. Prof., Geological Sciences
Whitman, John B., Ph.D., Harvard U. Assoc. Prof., Modern Languages and Linguistics
Widom, Benjamin, Ph.D., Cornell U. Goldwin Smith Professor of Chemistry, Chemistry
Wiesenfeld, John R., Ph.D., Case Inst. of Technology. Prof., Chemistry
Wilcox, Charles F., Jr., Ph.D., U. of California at Los Angeles. Prof., Chemistry
Williams, L. Pearce, Ph.D., Cornell U. John Stambaugh Professor of the History of Science Emeritus, Science and Technology Studies
Williams, Robin M., Jr., Ph.D., Harvard U. Henry Scarborough Professor of Social Sciences Emeritus, Sociology
Wilson, Robert R., Ph.D., U. of California at Berkeley. Prof. Emeritus, Physics
Wilson, Ron, B.G.S., Wichita State U. Asst. Prof., English
Woolf, John W., Ph.D., Yale U. Prof., Modern Languages and Linguistics
Wolczanski, Peter T., Ph.D., California Inst. of Technology. George W. and Grace L. Todd Professor of Chemistry, Chemistry
Wolff, John U., Ph.D., Yale U. Prof., Modern Languages and Linguistics
Wolters, Oliver W., Ph.D., U. of London (England). Goldwin Smith Professor of Southeast Asian History Emeritus, History
Wong, Shelley, Ph.D., U. of California at Berkeley. Asst. Prof., English
Wood, Allen W., Ph.D., Yale U. Prof., Philosophy
Wyatt, David K., Ph.D., Cornell U. John Stambaugh Professor of History, History
Yan, Tung-Mow, Ph.D., Harvard U. Prof., Physics/LNS]
Young, Martie W., Ph.D., Harvard U. Prof., History of Art
Zaikin, Raman, Ph.D., Stanford U. Asst. Prof., Computer Science
Zaslaw, Neal A., Ph.D., Columbia U. Prof., Music
Zax, David B., Ph.D., U. of California at Berkeley. Asst. Prof., Chemistry
Zec, Draga, Ph.D., Stanford U. Asst. Prof., Modern Languages and Linguistics

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